

## Impact of Climate Change on Cancer Burden

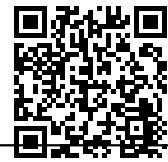
The impact of climate change on human health has come to focus in recent years, however very little is known about the effect of climate change on chronic diseases like cancer. We are discussing climate change, the exposures it generates relevant to cancer, the challenges faced to measure this impact and the potential disruption to health systems that are essential for cancer control, with eminent epidemiologist Dr. Robert Hiatt from UCSF Helen Diller Family Comprehensive Cancer Center and joining us on the patient panel is melanoma advocate, author, and teacher David Stanley.

### Full Transcript:

**Priya Menon:** Hello and welcome to CureTalks. This is Priya Menon your host. Today on CureTalks, we are discussing the Impact of Climate Change on Cancer and Cancer Control. We have with us Dr. Robert Hiatt from the University of California, San Francisco. Dr. Hiatt is Professor Department of epidemiology and Biostatistics and the Associate Director of Population Sciences of the UCSF Comprehensive Cancer Center. Joining Dr. Hiatt on the panel today is melanoma survivor, author, advocate and teacher David Stanley. Welcome to CureTalks everyone. Climate change affects more than weather patterns of the environment. It also has a substantial impact on human health. Its contribution to the cancer burden, includes increased levels of carcinogens, comorbidity factors, cancer incidents and reduce access to care. Dr. Hiatt, can you just summarize and talk a little bit about how climate change affects cancer.

**Dr. Robert Hiatt:** Sure. I'll be glad to and thank you for having me on this program. I'm happy to participate. Well, this is an interesting question, isn't it? Because cancer is a disease which occurs over a long period of time. You don't get cancer one day and get diagnosed the next. So, it has a long latent period from many different causes and so, the study on the relationship of climate change to cancer is evolving and we're still observing its potential effects. But when I was asked to write this review, we thought my co-author, and I and Naomi Bailar, who is a climate change expert got together to just consider all the possible ways that climate change could affect cancer. And basically, as we described in our paper, the effects of climate change are going to be on things that people pretty much understand now, extreme weather, heat, sea rise, unpredictable weather changes and things like wildfires. So, this is going to be a lot of things that happen in the environment. Only more recently however have people started thinking about the effects on health and the most obvious things are going to be the effects on infectious diseases or acute diseases that happen right away. So, the change of vectors of infectious disease can be influenced by temperature and the other effect is likely to be something on mental health, it is going to be a lot of changes that stress on individuals and populations which could have impacts that way. But for cancer, we had to think about a longer-term perspective and basically, I'll be happy to answer any questions about this, the kinds of things that are liable to affect cancer going to be the changes in air, water and food, quality and access. So, air pollution of various substances, sun exposure, food availability and quality and water access and its purity. So, those are the big categories and what we did was going into more detail for each one of them.

**Priya Menon:** Interestingly Dr. Hiatt, we were just brainstorming this talk within our team and my colleague was mentioning how he moved into a neighborhood near the airport. And during a party, the first get-together, he noticed that every house had a cancer story is this something that is related to climate change or pollution, aviation fuel in the air?



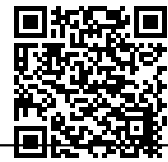
**Dr. Robert Hiatt:** Well, so interesting couple of things come to mind when you tell me that story. It is true that people who live near highways and airports are more exposed to fuel exhausts, fossil fuels and that's where you get, something called particulate matter 2.5 (PM2.5). It's a very small particle that gets into the deep part of the lungs and carries with its carcinogens. So, there is evidence that exposure to air pollution is associated with higher levels of certain types of upper respiratory cancers. And it also known that the air pollution occurs in places around highways and airports. However, climate change may have actually reduced the amount of air flights. So, this is a sort of thing that we need to look at over a long period of time to really assess. And the other thing is, your audience should know that this phenomenon which he described is called cancer clusters, where people notice cancers occurring in higher rate or seems to be occurring in higher levels in certain communities and certain exposures. When those kinds of clusters are examined very rarely do they turn up with any clear relationship to carcinogen exposure. It's usually more to do with how people who have cancer start talking about it with their neighbors and other people in their social circle and things come out of the woodwork. Oh yes, Josie had cancer. So it's a reporting phenomenon that has to be worked out. Scientists are very familiar with these cluster evaluations and need to sort out what's really due to a real exposure and what's due to a perception change.

**Priya Menon:** Thank you, Dr. Hiatt. Circling back to our climate change and cancer impact. How do scientists actually study these impacts? Because as you said, it takes like a long time to manifest and present. So, how are these studies conducted? Isn't that one of the challenges that you must be facing?

**Dr. Robert Hiatt:** Absolutely, because this is a very crucial point. Normally we study things by looking at an exposure and an outcome. So, we try to understand if it's associated and if it is associated, is it causal. So, in order to do that, epidemiologists and other scientists have developed methods, where we have comparison groups. So, we compare what happens to somebody who's exposed to somebody, who isn't, and we look for differences in outcomes. It's very hard to do that for climate change because everybody is exposed. So, what's your control group? And even if you think, well, we can compare one population in the United States to another population in the United States or maybe to Canada or maybe to South Africa. You, have problems with are they really comparable. There are so many other issues. So, long story short, it's very difficult to use traditional methods of establishing cause for climate change since the exposure is so ubiquitous. The way to study it I believe is through longitudinal studies that collect information on exposures, and people's health and follow them over long periods of time. So, you can tell from longitudinal studies that are sometimes called prospective studies, the relationship of characterizations that you make at the baseline of the study like that with what happens over time. That might take 10 years or 20 years to get the full benefit of these kinds of studies. But if I were the person holding the moneybags to do these kinds of studies, that's what I would emphasize longitudinal detailed studies to track health outcomes related to different types of exposures.

**Priya Menon:** What are some of the primary cancers that would be directly affected by climate change?

**Dr. Robert Hiatt:** Well, the first thing you need to look at is lung cancer. I believe lung cancer and other upper respiratory cancers. You also need to track skin cancers and I look forward to talking to Mr. Stanley about that given his own personal experience. I think also, you need to look at gastrointestinal cancers, things that are related to nutrition. So, stomach, colon, rectal cancers because they're going to be harder to attribute to changes in climate through changes in nutrition but still that's a viable pathway. I think those are the main categories that are likely to change.

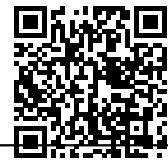


**Priya Menon:** Dr. Hiatt, you review talks, also, talks about weather disasters, and delaying, cancer treatment. It would be great if you can talk a little bit about that.

**Dr. Robert Hiatt:** Yeah, I think in terms of what's going to happen first with climate change, it's more likely to be something related to the way we take care of cancer patients and health. Let's call it health care or cancer care services. So, most people know or can appreciate that cancer is a very complex group of diseases. There's usually not one type of doctor that takes care of it. There are medical oncologists and radiation oncologists, and surgical oncologists, and surgical nurses and a complex support system, the drugs are complex, pharmacy is involved, the supply line for therapeutics is complicated. And then radiation oncology uses, very complex equipment that needs to be maintained in supply. So, because of the complexity, there are many different places in the health and the cancer care delivery process that can be adversely impacted by weather changes or disrupted by supply chain issues. And you just look around the world these days and you can see a lots of evidence of what has happened with the pandemic, with the recession and supply chain issues with the war in the Ukraine. These things are revealing the sort of vulnerabilities that the world has in terms of interacting and supporting all sorts of issues including medical care. So, I predict, if I need to predict anything, that the first things you're going to notice, it is going to be disruptions in the diagnosis, treatment and follow-up of cancer patients because of problems with supply chain and weather. There are a couple stories in my review where I talk about what happened in New Orleans with the Katrina storm where there were disruptions in sea level rise that causes flooding and environmental contamination of water. There are examples of weather changes in California with wildfires where there has been contamination of the air with chemicals that cause cancer. So, there's direct possible Interruption of the normal processes, the processes that we depend upon for the diagnosis and care of cancer.

**Priya Menon:** Thank you, Dr. Hiatt. I'm going to get David into the discussion now. David before you ask your questions, it struck me with when Dr. Hiatt said the vulnerability, right? So, when you were diagnosed David, I think quite a few years back, what was your thought process then because been diagnosed with melanoma has a direct connection to being exposed, right? So, what did you think that time? I know now you're very knowledgeable but that time what...

**David Stanley:** Much better. Yeah, I'm much better patient than I was back then. I was diagnosed I think it was 2005/2006. And of course, at that stage there really was nothing besides cut it out. A little bit of interfereon to a certain extent but in the last 10 years or so we've seen these massive changes in all kinds of these monoclonal antibodies that people are working with, and it has really increased course, the survival rate of melanoma. But at the same time due to a lot of climactic changes we're seeing massive increases in new cases. I was looking this up the earlier this morning because I wanted to be well-informed when we talked to Dr. Hiatt, we're looking at one point 3 or 4 million new cases of variety of skin cancers for 2022. In 2018, we saw about 56 thousand new cases of melanoma. The prediction for 2022 is nearly 100,000. 3 to 4 years later and we're looking at, I mean, 60,000 to 100,000 cases, that that's a huge leap. And there's it's not difficult to connect the dots in terms of climate change, UV radiation exposure and what we're seeing in terms of all these skin cancer issues. Now, in my particular case, it was easy because I spent 10 years of my life as a semi professional bicycle racer. I was on a bike 20 to 30 hours a week in sunny conditions. I was in my 20s, so of course I was 10 foot tall and bulletproof, a tan was a great thing because it meant you were spending all of your time out on the bike, you were training. And so, I ended up with Stage 2, nearly stage 3 melanoma. As my doctor said, if you had waited six months to a year, we'd be having very different conversations about your treatment options. And so, first question for you, Dr. Hiatt is my logic correct here



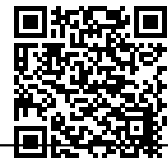
that over the last 10 years or these accelerations and skin cancer changes really are due to climatic changes that we're dealing with that are making us far more vulnerable to the ultraviolet radiation, that's responsible for so much of the skin cancers that we're seeing?

**Dr. Robert Hiatt:** Yes. The answer to that is yes. And it is well known that skin cancers, all three major types, melanoma, basal cell carcinoma, and squamous cell carcinoma are sensitive to ultraviolet radiation and damage to the skin that results from that. Melanoma, which is a cancer that you have is one that can be fatal and has been fatal for many people over the years. You are correct, it's not more easily treated with advanced types of medication, but the incidents, the number of new cases is going up dramatically. It's one of the cancers, along with thyroid and non-Hodgkin's lymphoma, and liver, that is increasing.

Most cancers are decreasing in terms of their frequency and death rates but melanomas are going up. Now it like the other types of skin cancer, it is sensitive to ultraviolet radiation and directly to human behavior in being outside in the sun, we've known that for a long time. What's different now is worrying about what the effect of climate change is going to be on the exposure to ultraviolet radiation. So, the only nuance on what you described that I would offer is that it used to be thought that the problem was the destruction of the ozone layer. Do you remember, the concern about refrigerants getting into the atmosphere and destroying the ozone layer? Well, this is true those chemicals did reduce the ozone layer and made exposure to ultraviolet radiation more likely, and easier, especially in certain parts of the world where the ozone layer was thinner. But there is an international effort to rectify that, and it resulted in something called the Montreal protocol in 1987, which effectively reverse the use of all these chlorofluorocarbons that are in refrigerants and has resulted in a closure of these holes in the ozone layer that we're all very happy to see. So, I would have to say parenthetically there's one example of international cooperation around climate change at least. So, what happens now is, that it's basically around human behavior. So when it gets hot, people can be motivated to get outside, cool off where they can take off their shirts or just strip out a bit and enjoy getting a tan or whatever. That's bad, that's going to lead to more ultraviolet light exposure and cancers especially worrisome as melanoma cancer. So, it's not so much that there's more ultraviolet light/ultraviolet radiation, it's more that human behaviors. I think most of the literature supports that human behaviors are likely to change with increased temperatures that can lead to more cancers.

**David Stanley:** In some of the reading I was doing as well, I was noting a big increase in colorectal cancers, especially among Gen Xers and Millennials, and typically, that's not an age group that colorectal cancers affect. Normally, with the numbers we see for that kind of skew, at least the data I saw skews a little bit higher, people into their 50s and above, not the younger people. What do you do if that's true and correct me if I'm wrong with this rise in colorectal cancers, to what can we attribute that? Is there anything going on in terms of climate change, that might have an effect on colorectal cancer rates increasing?

**Dr. Robert Hiatt:** What you state again is absolutely correct that there has been an increase in a number of new cases in individuals, less than 50, and screening recommendations start at 50. So, people younger than the normal age of screening have started to get cancer, that's been a worldwide observation. Mainly, I would say in Anglo countries like Canada and New Zealand and Australia, England but we don't know the reason for it. It has resulted in a change in the recommendations to start colorectal cancer screening at 45 used to be 50. So that's one policy reaction of the medical world to that observation. Colorectal cancer in older people is actually going down because of screening. So, you've got this weird crossover, where colorectal cancer incidents, new cases, and mortality are decreasing overall, but the young folks are getting more of it. I have a cousin whose daughter just got it at age 35. So, it's pretty dramatic. And the reason for it is unknown. If you look it up in authoritative sources, the speculation is just that its speculation around the use of antibiotics and perhaps changing what's called the microbiome and changes in the inflammatory



environment and the gut perhaps changes in environmental, chemicals in food. But it's all it's all hypotheses at this point. We really don't know the cause.

**David Stanley:** Let me throw this out there because it's something that I've been thinking about growing up here in Michigan and attending Michigan State, which is a big agricultural school. You have a fair amount of attention put on agricultural practices even if you're not a farmer. I grew up in the suburbs, my dad was a proctologist, but still, five years at Michigan State and I think where our food comes from and we know that small farmers, who many of them are better stewards of the land because of economies of scale are being squeezed out. And we also know that the agribusiness is not noted for being good stewards of the land and the best farming practices and is it a possibility that because of the way our food is now being processed and this is an age group that is extremely busy. They're being squeezed at both ends by aging parents they are having to take care of, by children they're having to take care of. Is it possible then that these highly processed foods that the agribusinesses contribute to are playing a role in these increased colorectal cancers?

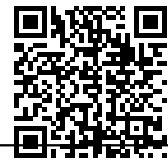
**Dr. Robert Hiatt:** Well interestingly, I grew up in Michigan too, but downstate in Ann Arbor.

**David Stanley:** It's a nice town, Ann Arbor. I like it.

**Dr. Robert Hiatt:** We don't have to go into that, but I think you have a point there. This should be an area for study. I think there are all sorts of reasons why agribusiness is not good for our food supply and for the environment. Diversity is pretty clearly preferable to monocultures, no matter where you are. Whether it's a Palm Forest in Liberia or farm in Brazil or a wheat field in Iowa, it's more productive for the short term but it has de meritorious effects on overall ecology, that was long before we started worrying about climate change. Climate change is likely sort to take advantage of the, and this is speculative take advantage of the vulnerabilities produced by these large monocultures and agriculture in ways that we don't know yet. But I think you raise a very good point and I think the French farmers in Provence have been arguing that for a while.

**David Stanley:** Yeah. Well let's talk if we can for diet, about diet for a second because of course when things get tough in terms of the economy, and our health, whatever the charlatans come out of the woodwork, you take this, you eat that and you're going to be...., the cancer diet, is there to your knowledge any tenable research about aside from high fiber, low and saturated fats, eat your fruits and veg, is there any kind of diet that you're aware of, that shows any kind of protection in general, in terms of promoting better health and protection against cancer?

**Dr. Robert Hiatt:** I talked a little bit about this in my review, and the short answer is yes. And I think the things that we know, that can be protective against developing cancers are diets that are rich in fruits and vegetables, low in red and processed meats, and diets which help you avoid being overweight or obese. One thing that's happened with cancer research and epidemiology in the last 20 years, has been the clear relationship between obesity and cancer. Probably through some inflammatory pathway. But half of the individuals less than 40 or 50 in the United States are overweight and about 17 percent are obese. So, there you have, one of the possible relation or causal factors related to increased colorectal cancer in young people. But it's true in general that obesity can be related to about 17 different cancers. So, if people are looking for a way to prevent cancer through diet, eat your fruits and vegetables, modest amounts of red meat, and processed meat, and avoid becoming overweight as much as you can and that's going to relate



to physical activity too. It's right there with it.

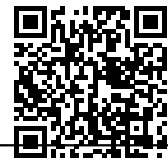
**David Stanley:** Yeah, let me change the subject just a skosh here. Here in the west anyway, I'm not so sure how popular electric vehicles are in other parts of the world, but here in Europe and America big push obviously for electric vehicles, but we're only seeing about 20 to 21% of our current electrical power is from green sources. So, that means 75-80 percent of the electricity that's being generated to run these cars that are burning fossil fuels is probably coming from some sort of fossil fuel, whether it's coal, or whatever. Do you see that I don't want to say hypocrisy, but do you see that? But do you see those two bumping up against each other in any particular way, in terms of climate change, and how that might lead to some sort of effect on our health?

**Dr. Robert Hiatt:** Good question. I think the way to think about it is we're in a transition period. I think that 17 percent or twenty-one percent that you mentioned is a point in time, but I think the use of electric vehicles is increasing rapidly. And just last week, we finally got a, I guess almost have a bill that will help support the use of electric vehicles as part of the climate change legislation, which is a great thing. I think that change needs to occur at the policy level, but I think individuals should not be inhibited. This is a personal feeling, but I'm not sure if the data for it but I don't think individuals should be discouraged from purchasing an electric vehicle if they can't because of some fear of actually using more coal. I think there's going to be an increasing turn toward non-fossil fuel sources of energy in the next decade. And I think we're just looking at things at a point in time and not a conflict. I mean, you can any different slice you want to take off our experience, can make you ask the question which you did. But I think if you think a longer view and realize how rapidly things are changing, then you can be fairly optimistic.

**David Stanley:** And this is more back to you, back to the review of the article, which I read. Actually, I've read it three times now because it's pretty interesting stuff. And we are seeing massive melt-offs in glaciers, we're seeing ice shelves being destroyed at ever-increasing rates and obviously with lots of bad results here. But people tend to focus on things like rising water levels, but my concern is all over the last fifteen thousand years. A whole lot of stuff has settled into that ice and as that ice melts, are we going to see an increase in carcinogens that have been held in either solution or frozen in that ice and released into the atmosphere? What kind of outcome are we looking at besides just the obvious for Miami Beach is going to be underwater here in another five years?

**Dr. Robert Hiatt:** Yeah, well that's the thing that people are concerned about, and it does affect food production in the sense that it decreases the amount of arable land in some places especially the island populations. But the point you're talking about is really interesting if we found a one example, so you can't really measure increased pollution in the oceans. It's drop in the bucket type of problem. But if you think about glaciers and Switzerland or European sources of water from glaciers, there you can capture the runoff and there have been investigators in Europe who have looked at contamination in water that's come from glaciers and found carcinogens in them just as you point out. So, I think although there's not a lot of literature supporting that and confirming it, I think it certainly supports the idea that it can be a problem. And so, I think that's another area that people are going to want to look at more closely over time.

**David Stanley:** One last question and moving back to melanoma, aside from the things that were already doing wearing our hats, UPF clothing, and SPF unexposed skins and is there anything that in terms of



climate change and increased rates of melanoma, is there any sort of warning, any kind of take away that I can take to, like, the people who follow my page on Facebook about melanoma? Is there anything I can take to them that they can help protect themselves as over the next 10, 15, 20 years as we continue to see melanoma rates rise as climate change affects our world?

**Dr. Robert Hiatt:** I think you probably covered it to be perfectly honest. I think the things that people need to do to protect themselves against getting melanoma, are all the things that you mentioned, and I'll throw in obesity and overweight. So, that doesn't change the thing that changes with climate change is that there's likely to be more intense, all these things become more important. So, I think if you continue making those kinds of recommendations

and point out to people that this is going to be increasingly important over time, that you are on sound basis, sound ground.

**David Stanley:** Right, Priya.

**Priya Menon:** Thanks, David.

**David Stanley:** By the way, Dr. Hiatt really interesting to talk to you because I think you've hit on an area that has not been addressed in terms of either climate change, the effects or increasing rates of cancer, and the way you brought those two together, I think it's, if we're not here in the call now, we're not ever going to hear it. So, thank you very much.

**Dr. Robert Hiatt:** Well, the thing, I'm curious about is how I came up with Josie and you have a dog named Josie, I mean that's weird.

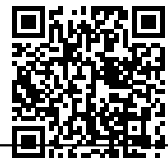
**David Stanley:** Yeah, right? Absolutely, I thought that too.

**Priya Menon:** Thank you David. Great questions you had there. Dr. Hiatt, before we wrap up, just one last question. You did in your review; you also talk about methods to mitigate the effects of climate change. I know you talked about food and diet, what we need to eat or not follow, and you talked about melanoma, I mean David almost covered it. Is there anything else to add to this?

**Dr. Robert Hiatt:** Well, you're giving me a chance to talk about the importance of policy change, I think. And all these things, we've talked about what you can do as an individual, unless there's some changes in the way we live on this planet, it's not going to make all that much difference. So, I think if your audience has any enthusiasm or energy to do something about this, it's going to be through their political representatives and what they can do to legislate or pass policies that are going to be protecting the environment. So, this is going to be around fossil fuels, coal and electric cars and alternate sources of energy, all these things I think are going to be important. And I think individual action in a policy sense is going to be the most important thing.

**Priya Menon:** Thank you, Dr. Hiatt that's a very informative session, and David, as always, you had some great questions, the reason I pull you into these talks. So, thanks for them.

**David Stanley:** Always a pleasure.



**Priya Menon:** We also thank UCSF Helen Diller Family Comprehensive Cancer Center. This talk will be available on [curetalks.com](https://curetalks.com). So, thank you everyone, and have a great day.

**Dr. Robert Hiatt:** Thank you, a pleasure to participate.

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