

# New Grant Funds Research on Circadian Disruption and Its Potential Link to Liver Cancer

Dr. Trang VoPham talks about her research into solar jet lag, including how it can impact your health.

April 23, 2026 By Fred Hutch News Service and Diane Mapes

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Just as traveling from time zone to time zone can cause sleep disturbances, fuzzy thinking and overall discombobulation, solar jet lag can result in negative health effects.

What is solar jet lag? According to Fred Hutch epidemiologist [Trang VoPham, PhD, MPH, MS](#), it's when your internal clock, or circadian rhythm, is misaligned with the sun's clock. People who work at night and sleep during the day often experience this type of circadian disruption. Ditto for those who live in western time zones.

Thanks to a new grant from the [American Cancer Society](#), VoPham is about to launch a five-year investigation into solar jet lag and whether it may be driving the most common form of liver cancer — hepatocellular carcinoma, or HCC. Major known risk factors for HCC currently include cirrhosis (chronic liver disease), chronic hepatitis B virus, chronic hepatitis C virus, heavy alcohol consumption, MASLD, obesity and diabetes.

VoPham believes HCC, a leading cause of death in the U.S. and worldwide, may also be driven by solar jet lag.

## Key takeaways:

- Dr. Trang VoPham is an epidemiologist with Fred Hutch's Public Health Sciences Division.
- That means she's a disease detective, exploring the "whys of cancer," particularly environmental and lifestyle exposures that may encourage cancers to start growing.
- VoPham runs the Geospatial Exposome Lab, or [geoexlab](#), where she focuses on research (and interventions) at the intersection of geospatial science, epidemiology and the environment.

- VoPham was also the recent recipient of nearly \$1 million in research funding from the American Cancer Society.
- With the grant, she will investigate whether the most common form of liver cancer — hepatocellular carcinoma, or HCC — might be driven by solar jet lag.
- Solar jet lag is a circadian disruption caused by differences in the timing of a person's exposure to light. It's when your internal clock, or circadian rhythm, is misaligned with the sun's clock.
- The new study will pair electronic health records from the [Veterans Health Administration](#) with a new high-resolution geospatial light exposure model for solar jet lag to quantify the association between solar jet lag exposure and HCC risk.
- Solar jet lag is very much a modifiable exposure; people can take steps to counteract its effect.
- VoPham and her team plan to design interventions — everything from behavioral modifications (like eye masks for sleep) to public health policy recommendations — to help those who may be impacted.

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### **TRANSCRIPT:**

Diane Mapes:

Hi there. This is Diane Mapes from Fred Hutch News, coming to you today with the Fred Hutch Podcast, From Bench to Bedside and Beyond, with a special guest, Dr. Trang VoPham. Trang is an epidemiologist with Fred Hutch's Public Health Sciences Division. That means she is a disease detective, studying the different factors that can lead to diseases such as cancer.

Dr. Trang VoPham, welcome. Can you tell me a little bit about what you study at your lab?

Dr. Trang VoPham:

Sure, of course. I am the principal investigator, or PI, of the Geospatial Exposome Lab, and we

conduct a series of epidemiologic and translational projects looking at the role of environmental risk factors in disease. We use geospatial science technologies, or location-based technologies, to do so.

Diane Mapes:

Can you talk a little bit about some of the exposures you've come across and how they can impact us?

Dr. Trang VoPham:

We have conducted a series of epidemiologic studies among human populations looking at the role of different environmental exposures in relation to disease. This includes air pollution and wildfires, for example.

In one specific example, we published an epidemiologic study last year where we linked geospatial data on air pollution and wildfires, both derived from satellite imagery, with cancer registry data. We were able to show that the association between air pollution exposure and risk of dying from cancer among cancer patients was stronger in areas that were more heavily impacted by wildfires. That's one example of the studies we've conducted.

Diane Mapes:

That's news we can use. I'm a cancer survivor myself, so it's good to know that something like wildfire smoke -- and we get a lot of wildfires in the Pacific Northwest because we have so many beautiful trees -- could put me at risk, maybe for metastatic recurrence.

Now some of the things that you study are unexpected exposures, and one of them has to do with light exposure, especially light at night, and how much the circadian rhythms of the body can be disrupted by light.

Can you talk a little bit about light exposure and circadian disruption, and some of the findings that you have there?

Dr. Trang VoPham:

A wide variety of biological processes, such as sleep timing, are driven by circadian rhythms, and the timing of these approximately 24-hour rhythms is primarily set by the timing, intensity, and duration of our exposure to light. Light is very important.

When the time in our body is not aligned with what we are doing, for example, being awake at night and sleeping during the day, which is required for shift workers, this results in what we call circadian disruption, which negatively impacts health. Shift work is one type of circadian disruption, and solar jet lag is another specific type of circadian disruption, or circadian misalignment.

Solar jet lag is defined as the difference in light exposure experienced by people based on their geographic location within a time zone.

For example, suppose we have two people, one living in Seattle, Washington, and one living in Spokane, Washington. Despite both being in the Pacific Time Zone, the person in Seattle, on the western edge of the time zone, experiences sunrise and sunset more than 20 minutes later than someone in Spokane, on the eastern edge of the time zone. The relationship of the body clock relative to standard work hours is quite different for those two people, and this can lead to a chronic state of circadian misalignment, which has been associated with adverse health outcomes, including hepatocellular carcinoma, or HCC. We will be investigating that in a new American Cancer Society research scholar grant.

Diane Mapes:

So when you were talking about solar jet lag, most of us here recently just had to change our clocks, right? We lost an hour, and it leaves a lot of people feeling discombobulated. So this is sort of a discombobulation of the body that can disrupt it on a system-wide basis?

Dr. Trang VoPham:

We've seen in experimental settings such as animal models, for example, showing that circadian disruption generally promotes the development and progression of liver disease and HCC. Our sleep and circadian collaborators have pointed to circadian regulation as a major determinant of liver physiology.

Similar to other organs, the liver has an internal circadian clock and timing system that adjusts physiological processes to their relevant time of day. There are advantages to that; for example, we metabolize food more efficiently during our biological day. Disruption of the circadian clock, such as due to shift work or solar jet lag, leads to dysfunction of circadian clock-controlled cellular processes and molecular pathways, which has been linked to the pathophysiology and progression of liver disease, as well as to risk factors for HCC such as diabetes, obesity, metabolic dysfunction-associated steatotic liver disease, or MASLD.

There have also been epidemiologic studies among human populations, including one we published in 2018, showing that solar jet lag is associated with a higher risk for developing HCC. However, this prior work was based on a relatively crude way to measure solar jet lag. In this new American Cancer Society grant, we will be leveraging our newly developed high-resolution geospatial model for solar jet lag and linking it with geocoded residential addresses of U.S. veterans – the precise locations of where these patients have lived over time -- which will improve our ability to investigate the impact of solar jet lag exposure on HCC.

Diane Mapes:

So it will give you a good idea of the impact of solar jet lag on these patients? You're going to just be starting this study, and then it's going to run for probably a few years?

Dr. Trang VoPham:

Yes. This was awarded this year, 2026, and it will run through 2030.

Diane Mapes:

And we can do things to prevent solar jet lag. It's not like you're just stuck living in the wrong time zone, right?

Dr. Trang VoPham:

There are definitely ways to modify exposure to solar jet lag. You do not have to move to a different location or time zone. Some researchers have described having a healthy "light diet," meaning optimizing the timing and amount of light exposure to promote health and well-being.

For example, a person could time their light exposure appropriately each day, with bright light in the morning and avoidance of light in the evening. Behavioral and environmental modifications such as window shades and eye masks can limit exposure to light at night. Practices optimizing sleep timing, duration, and regularity are beneficial for health in general, and limiting nightly use of blue-light devices such as phones is also an option.

Interventions at the policy level that have demonstrated reductions in circadian disruption, include flexible or hybrid work hours, as well as delayed school start times to facilitate the alignment of social and work commitments with biological time. For example, in 2022 California became the first state to pass a law requiring high schools to start no earlier than 8:30 a.m. and middle schools no earlier than 8:00 a.m. There are definitely ways to address circadian disruption spanning the personal to policy levels.

Diane Mapes:

I would think that any shift workers or folks who have a tendency to stay in bed for three hours looking at their phone before falling asleep may want to hear some of this too. I never realized that light disruption and circadian disruption could have such a harmful effect on the body.

Is there anything else you would like to share with the audience about your work, or any other unexpected exposures that people might want to think twice about?

Dr. Trang VoPham:

Our lab has been doing more translational work, thinking about how to go about using knowledge gained from epidemiologic studies on disease etiology to create real change that promotes population health and improves health and well-being through designing and implementing strategies for population-wide and individual-level disease control programs and policies.

For example, our lab has been developing the Geospatial Exposome Map, or GeoExMap, a new geospatial tool to support community outreach and engagement at the Fred Hutch Cancer Center.

It will be a geospatial web app that we aim to launch this year, allowing people to learn about neighborhood-level health and environmental data.

This includes information on air pollution, wildfires, radon, noise, green space, cancer burden and many more.

In addition to promoting disease and cancer prevention and control efforts, this web app will include actionable, practical tips with links to evidence-based strategies for exposure mitigation of modifiable risk factors, such as where and how to access free radon test kits to lower lung cancer risk.

Diane Mapes:

Most people don't realize that, right after smoking, radon is the number two cause of lung cancer. It's really important to know if you have that in your neighborhood or in your house, and with your geoxmap, that kind of information can be gleaned.

Also, people who live in urban heat islands where there's no shade may not realize the importance of trees, shade, green spaces and blue spaces for their health. It's fascinating that you're able to dig into the environment and find the things that we should avoid and promote the things that can help our health.

Now, with the GeoExMap, if you find that you live in an area like an urban heat island, what would you tell someone?

Dr. Trang VoPham:

A person using GeoExMap will be able to view information such as temperature at a pretty granular neighborhood level, and we will include tips on how to access extreme-heat cooling centers. There will be actionable information associated with viewing that data, but it is really a launching pad. You can learn more about your neighborhood environment, and if you want to look further, you can reach out to us and we can point you toward other datasets. There are many different target uses that we have in mind.

Diane Mapes:

Well, it's empowering people to take control of their own health and improve it, which is great. And basically what Fred Hutch's Public Health Sciences Division is all about: empowering people to live better, healthier lives.

One of the things that can drive you nuts when you're diagnosed with cancer is: Where did this come from? Why did I get this cancer? And so epidemiology, that's what you're doing. You're digging into the "why of cancer." I think having answers like that can really be helpful for your own peace of mind, and also you can share with others too, maybe to help prevent cancer. I applaud that work and it's not easy!

Dr. Trang VoPham:

This research program can be very valuable because, as we've discussed, there is a modifiable aspect. There is a part of this that is within your control. Should we demonstrate in this American Cancer Society-funded study that solar jet lag does indeed increase the risk of developing HCC, there are steps that people can take to lower their exposure to solar jet lag.

I am an epidemiologist, but I have the honor of working with really wonderful clinicians. For example, Dr. George Ioannou, director of hepatology at the VA Puget Sound Health Care System, and other clinical hepatologists, Dr. Nicole Kim and Dr. Philip Vutien, at UW Medicine. They really enhance this work by providing context and expertise on the clinical side of liver cancer. That is one of the many reasons I am so excited about this research project and why it is so strong.

Diane Mapes:

Dr. Trang VoPham, thank you so much for joining us on Fred Hutch's Bench to Bedside and Beyond. We really appreciate your work, and congratulations again on the grant. Great work.

Dr. Trang VoPham:

Thank you.

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