Supper, Sleep, Circadian Rhythms and Cancer Risk

How going against our internal clock can trigger disease.

August 9, 2018 By Diane Mapes

When you eat may be as critical as what you eat for your risk of breast and prostate cancers, a research team reported this week.

The findings came from a Spanish study published in the International Journal of Cancer, which was led by environmental, occupational and molecular epidemiologist Manolis Kogevinas, MD, PhD, of Barcelona's Institute for Global Health. Kogevinas is currently a visiting professor at Fred Hutchinson Cancer Research Center.

In a nutshell, participants in the study who ate dinner before 9 p.m. or waited at least two hours after eating before going to bed had a 26 percent lower risk of prostate cancer and a 16 percent lower risk of breast cancer than those who either ate after 10 p.m. or ate and then promptly hit the hay.

Kogevinas studies circadian rhythms and how these intertwined systems maintain our body's metabolic, immune, renal, liver and other physiological functions as we go about our 24-hour day. This inner clock regulates our sleep, our energy levels, our hormones and our body temperatures. Mess with the timing — as we do when we stay up late staring at our TV, laptop and smartphone screens — and you can bump your risk for disease, including cancer.

On sabbatical in Seattle, Kogevinas decided to take advantage of his proximity to public health hubs Fred Hutch and the University of Washington to lay the groundwork for future large population studies that could confirm his findings and set the stage for cancer prevention recommendations.

We asked him to delve deeper into "mistimed eating patterns" and how they might impact cancer risk. He also filled us in on what else is happening in the realm of circadian disruption. This interview has been edited for length and clarity.

Our bodies, our systems, have circadian rhythms. And we've lived by this internal clock for a long time, correct?

Yes, humans developed over time to be active during the day and rest during the night. But over

the last 150 years, we've changed that. We're trying to evaluate this big difference in our society, which is now a 24-7 society. We want to know, "What are the good things and what could be the bad things?"

It's not that it was good then and now it's bad. We're saying we evolved in this way and now we've changed that. It is not improbable that this has some unwanted health effects. That's what we're investigating.

There's more emphasis on circadian rhythm research now; last year, the Nobel Prize went to researchers in this field.

In your new study, you looked at the timing of supper and sleep and how that timing might impact circadian rhythms and cancer risk. Is this a new area of research?

Yes. I went into it because we don't have a lot of epidemiology studies on this. We know about what we should be eating and how much, but we don't know when.

There are studies in mice where they give them a hyper-caloric diet but give it to them during the day. And the mice become obese because they're nocturnal. The same diet at night does not result in obesity because they metabolize more efficiently at night; they function at night. Give them the diet at the wrong time and their bodies cannot cope.

These types of experiments motivated me to look at how the timing of meals would affect humans. We had animal studies that showed timing is important but we didn't have any human studies.

So what was it that reduced the breast and prostate cancer risk? Was it waiting at least two hours after supper before sleep or eating supper earlier?

We can't distinguish in this study whether it's having supper early or whether it's leaving time between supper and sleep. What we saw is that you have a bit higher level of prevention if you eat early and you leave more time before sleep — the effect is stronger if you do both things.

Mainly, the findings indicate that there are better times to do some activities during the day and eating is one of them. Eating is the second most-important factor in determining the circadian cycle. Light is most important.

Would this protection hold for other cancers, then? Would it apply to reducing recurrence, too?

Let's do the research first.

Circadian disruption can have many health effects, not just cancer. We have epidemiological studies showing particular effects on cardiovascular disease, diabetes, hypertension, obesity and several cancers.

The mechanism is general. So there's no specific reason to say it would only be breast cancer or prostate cancer. We looked at these cancers because they are two of the most common cancers worldwide and because have some commonalities. Breast and prostate cancer are both associated

with night-shift work. [That is, people who work at night and sleep during the day often have higher rates of breast and prostate cancer.]

As for recurrence, we are following the cancer cases and will look at whether this affects recurrence, but we have to wait until we get more solid evidence.

In your study, you didn't factor in late-night snacking, although you did find that 7 percent of the Spanish participants had an after-supper snack. Here in America, we may snack more. Could lots of late-night snacking make things worse?

I've been talking with some of Fred Hutch's researchers, like Mario Kratz, PhD, about how important it may be to have a prolonged resting time without eating. If you have an early dinner and then do some late-night snacking after that, you would just restart the whole system. The liver would start metabolizing.

This is an area of research being investigated here at Fred Hutch and it's one of the things I'd like to work on while I'm here.

I cannot answer your question in reality — how good or how bad it is — but I do want to continue this discussion and see how I can incorporate mechanistic evidence into big population studies.

What are your next steps for this research?

I'm contacting a number of researchers who have cohorts [i.e., detailed studies of large groups of people] in different countries to see how well we can replicate the findings. It would also be important to do this research in different ethnic groups. Fred Hutch's Parveen Bhatti, PhD, for example, has shown that Asians doing night shift may be better able to maintain a "normal" circadian pattern of melatonin production compared with whites.

Most cohorts don't have these questions [about the timing of meals]. They've focused on what we eat and how much we eat but not when we eat. We're talking to a number of researchers who have cohorts to see if we can add questions. The results will come in a few years.

What else are you working on?

My team and I are doing a lot of studies in molecular epidemiology [a branch of science that looks at the various pathways that influence the development of disease].

We're looking at blue-light exposure which you find in LEDs and on TV screens and tablets and smartphones. Blue light suppresses melatonin [a hormone that regulates sleep and wakefulness]. We published a study a few months ago showing that blue light has a particular effect on breast cancer and prostate cancer. But again, we need many more studies before we can do recommendations.

Interestingly, our cities are converting to blue-light LEDs rather than the softer, red-light LEDs because they're economical. But maybe they should go for the softer LEDs because they do not suppress melatonin as much.

Also, it is important to evaluate other pathways than melatonin through which light may affect health: for example, sex steroid hormones [such as estrogens, progestogens and androgens]. That's a very important pathway and it's an area where Fred Hutch's Bhatti and Scott Davis, PhD, have done some very nice research. It is not only melatonin that's suppressed in night-shift workers; there are a number of effects on hormonal pathways that may be directly affecting prostate and breast cancers.

You said it's still early days for this area of research, but can you offer any recommendations at this time?

We can't do recommendations based on one study. We have to do the same research in different social settings and cultural settings and see what happens.

But you don't need an epidemiologist to tell you if you have a big, late supper, if you eat and drink and then go to sleep, you won't sleep well. Where you need the research is to tell you if this has a long-term effect if you do it systematically.

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