

LuAnn Heinen

When you go to sleep each night, your body recovers. At the center of that is our circadian rhythm, an internal clock that tells every cell in the body when to wake, when to rest, and when to repair. But many of us don't make good sleep a high priority. Scientists now tell us that poor sleep doesn't just leave us tired, it reshapes the brain, strains the heart, disrupts our metabolism, and even weakens the immune system.

I'm LuAnn Heinen, and this is the Business Group on Health podcast, conversations with experts on the most relevant health and well-being issues facing employers.

On this episode, we dig into the archives with two of our best interviews on the all-important subject of better sleep. It would take much to make a list of the negative effects of poor sleep. It affects health in all sorts of ways - memory and learning, blood pressure, insulin resistance, and even risk-taking behavior, to name a few. In the second half of today's show, a fascinating discussion about this with a researcher at the Center for Human Sleep Science at the University of California, Berkeley. But we start with something that's essentially foundational when talking about sleep, circadian rhythm.

Russell Foster

You can think of circadian rhythms as an internal biological representation of a day. We genuinely have an internal clock with a period of around about 24 hours and we use this to adjust essentially every aspect of our biology.

LuAnn Heinen

Russell Foster is the head of the Nuffield Laboratory of Ophthalmology and director of the Sleep and Circadian Neuroscience Institute at the University of Oxford. He says that our bodies have something of a logistics challenge to take on. Not only do we need the right nutrients and bodily chemicals to show up in the right tissues and organs, but we need these functions to happen at the right time. Circadian rhythms aren't obvious to many of us.

Russell Foster

It's the circadian system that gives you this wonderful structure in both time and, of course, within the space of the body. Why do we need it? Well, we live in an incredibly complicated world. We're on a planet that revolves once every 24 hours. The response of essentially all life on the planet has to adapt to the huge changes in light intensity and temperature and all the rest of it. So many creatures have divided up the earth on the basis of being either day active or night active and those are profoundly different states. We have to have a very, very different biology to adapt to either consciousness for us, the wake state, or sleep, which is of course a profoundly different state and requires a different metabolism, a different level of brain activity in certain specific regions of the brain. It's the circadian system that gives you this timing.

LuAnn Heinen

Professor Foster points out that our internal clock, no matter how amazing in itself, is only useful if it's in sync. And you might ask, in sync with what? And that would be the sun. Your biology works best when your internal day is synchronized with the external day-to-night cycle of sunlight during the day and darkness at night.

Russell Foster

What we need is daily exposure to the light-dark cycle and that's the primary way in which the internal clock is set to the external world. Now, it's not the only factor. When we eat and when we exercise can also help, in train, regulate our circadian system, but light is by far the most important factor.

LuAnn Heinen

I would vouch that most of us really are not thinking about setting our internal clock to the external world. We tend to think we've progressed. We, as a modern society, do what we want at whatever time we want. We work night shifts. We do travel across time zones, without skipping a beat. We stay up till 2 a.m. on Saturday night and catch up on Sunday.

Russell Foster

Yeah, I think we, as you rightly point out, feel that we can do whatever we want, whatever time we choose, and of course, we can't. We are the product of tens of millions of years of evolution and we can't just abandon that biological baggage. We can't do what we want whenever we choose. We are bound by our internal clock, which, of course, is set to the external world.

LuAnn Heinen

We don't all sleep the same way or on the same schedule. Some people genuinely thrive on just six hours of rest, while others may need ten to function at their best. Our needs also shift as we age. Babies may sleep up to 20 hours a day, while adults settle into much less. But it's not only the amount of sleep that varies. It's also the timing. Some people are natural early risers, whom Professor Foster calls larks, while others are most alert late at night. Not surprisingly, these people are owls. The differences aren't just about preference. They're rooted in biology. Scientists call this your chronotype.

Russell Foster

Our chronotype can be defined on the basis of three things. One is our genetics. We now know that there are tiny changes in some of the critical clock genes that can predispose us to want to be a morning type or a late type or, of course, an intermediate type. So by our genetics, our parents are still telling us what time to get up and go to bed. The second is our age. From about the age of 10, there's a tendency to want to go to bed later and later and later, and this peaks in our late teens and early 20s. Men tend to peak later than women and tend to have, on average, a later chronotype. Then we'll move to a more morning chronotype as we age. By the time we get to our late 50s and early 60s, we're getting up and going to bed at about the time we got up when we were 10, 11, 12. Significantly, that is about a two-hour difference. So we've got our genes, we've got our development, and that's closely linked to changes in some of the puberty hormones, the sex steroids, rising rapidly during those early years and then declining slowly as we age. But there's a third factor which determines our chronotype, which is when we see light. Light has different effects at different times. So dusk light delays the clock, will make us get up later and go to sleep later. Whereas morning light means that we'll get up earlier and go to bed earlier. So when we're all agricultural workers, we were exposed to a symmetrical light-dark cycle and so the delaying effects of light at dusk and the advancing effects of light at dawn would be sort of compensated, they'd self-correct. But many of us now only sample part of the light-dark cycle. We live in dim, dark caves essentially. We did some studies a few years ago on university students all around the world and showed that the later the chronotype, the more owl-like they were, the less morning light they actually detected, which would advance their clock, make them get up earlier, and they got much more early evening and dusk light, so that shifted the clock to a later time. So we have our genetics, we have how old we are, and when we get light exposure and that all adds up to the type of sleep-wake timing that each of us will experience.

LuAnn Heinen

One important distinction I realized when talking with Professor Foster is the difference between circadian rhythm and sleep. They're intertwined. Your circadian rhythm is your internal clock. Sleep is a state of rest. Your internal clock tells your body when to rest. If you don't get enough sleep, it can desensitize the circadian system to light.

Russell Foster

We tend to use the term now is sleep and circadian rhythm disruption, or SCRD and the consequences of SCRD are very wide ranging. We can sort of think about the impact of SCRD on our emotional responses and so we find sort of fluctuations in mood, irritability, increased levels of anxiety, loss of empathy. I think this is a very interesting one. We actually fail to pick up some of the social and emotional signals from other people, our partners, or our work colleagues, or our friends. Risk-taking and impulsivity, you do stupid and unreflective things if you've got sleep and circadian rhythm disruption. Very interesting studies have emerged showing that the tired and circadian disrupted brain has what's called a negative salience, which means it remembers negative experiences, but forgets the positive ones. So one's whole worldview and one's decision-making is biased by these recollections of negative rather than positive experiences. You can also slide into sort of stimulant use, so if you're tired, you'll want to drive the waking day with excessive coffee perhaps. Then of course, you need to turn that off because caffeine in coffee has a long half-life. It hangs around in the body for quite some time, and people will then use alcohol or sedatives to reverse those effects of the alerting effects of caffeine and the problem is they are sedatives. They don't provide a biological mimic for sleep. In fact, they can disrupt some of the really important things going on within the brain whilst we sleep. There's some of the emotional things that can be affected.

LuAnn Heinen

The modern science of sleep is surprisingly young. In ancient Greece, Aristotle thought sleep was caused by vapors rising from food digestion. Centuries passed, and the concept of sleep hadn't advanced much. Mostly, it was seen as a passive shutdown of the body, not an active biological process. But in the 1920s, with the advent of early EEG technology, scientists discovered that the brain was highly active. In the 1950s, REM sleep was discovered. The beginnings of the biological understanding of circadian rhythms came about in the last half of the 20th century with research on fruit flies. In 2017, a Nobel Prize was awarded for discoveries of circadian rhythm genes. Professor Foster says the field's growth has been accelerating. He used to attend circadian rhythm scientific meetings where 120 people showed up.

Russell Foster

Now we're thousands of people that attend our meetings. People will understand what sort of broadly meant by circadian rhythm, so I think we're a new field. The medical curriculum, and I teach pre-medical students, is crammed to bursting. In a five-year pre-medical training, many medical students may get one or two lectures, that's it. So there's a lack of education. When I talk to my family of medics, I sort of say, why aren't you paying more attention to drugs at specific times of day, chronic sleep deprivation, the importance of circadian rhythms? They will respond that, you know, our health care professions are running as fast as they can to stay where they are, classic sort of Red Queen, and trying to just impose yet another layer upon the things they have to think about. Their brain is full, in a sense, and until we can really demonstrate the importance of circadian rhythms to individual health, I don't think they will pay attention. Which is, again, why I wanted to write the book *Lifetime*, to make it accessible, so that patients will then ask their doctor, well, what time should I take my medication? You know, is there a time factor here?

LuAnn Heinen

Let's talk about timing and impact of taking medications, eating, exercise.

Russell Foster

Yes, I think this is really interesting. So exercise, we kick off with exercise. During the sleep state, we are mobilizing stored calories to keep our metabolism going and our life going. During wake, of course, we're taking calories in because we're eating, and we're burning those calories to sustain our metabolism. Our metabolism is fundamentally different during the sleep state and the wake state. One argument for exercise is that when you wake up, do some exercise before breakfast,

because that's much more likely to burn off stored calories. The problem is that first thing in the morning, we're not great at exercise. The amount of power we can exert and the sort of energy we can commit is relatively low and our ability to exercise increases throughout the day, and it peaks late afternoon, early evening. That's when all the Olympic records tend to be set.

LuAnn Heinen

Is that regardless of chronotype?

Russell Foster

Ah, no, I was going to come to that. That's a really important point, because if you're a morning chronotype, your athletic abilities will peak earlier in the day. The suggestion for exercise is that a short bout of exercise before breakfast, you know, can burn up some of those stored calories. But then exercise later in the day, late afternoon, early evening, means you can exercise for longer and with greater power, and so a long bout of exercise later in the day.

LuAnn Heinen

The bottom line is we're exercising twice a day.

Russell Foster

Well, ideally, yes. But if you want to do it for longer with greater vigor, then you're going to do it before you go to bed and that's great, because what that will also do is burn off some of the stored calories that if you haven't used up will be laid to fat and to stored calories. It's good to get rid of those calories if that is an issue for you. That's part of the issue. The other thing is that the circadian system is constantly gating our metabolism. For example, if you have the same level of glucose infusion, and some wonderful studies from Eve Van Couter, University of Chicago, did this in healthy young males and showed that same levels of glucose in the morning, lunchtime and evening, those glucose levels will come down much faster in the morning and at lunchtime than if you consume a large glucose meal later in the day. So try and concentrate your calories during the first half of the day and have a lighter end of the day. Now, of course, that's what people used to do in medieval times. Now, of course, with long commutes and having to spend one or two hours getting into work and then getting away from work and the demands of work, many people will have almost no breakfast, have maybe something light at lunchtime at their desk and then have the huge great calorie intake at the end of the day. Our bodies can't deal with it as effectively and that massive glucose and calorie intake at the end of the day is associated with a high chance of obesity and type 2 diabetes.

LuAnn Heinen

Yes and then there are the night eaters, even the can't sleep, get up and eat at night.

Russell Foster

Absolutely, and of course, shortened sleep duration has been associated with greater chances of obesity. If you are sleep deprived, you'll want to eat more, which is a big issue. Now, of course, if you're not sleeping, then you're active and if you're active, you're more likely to be raiding the refrigerator. There's a double whammy here. If you're active, you're going to be up and likely to be eating and of course, your whole metabolic axis is distorted by lack of sleep and you'll crave carbohydrates and particularly sugars.

LuAnn Heinen

Well, let's move on to taking medication. Any advice on timing of that?

Russell Foster

Yes, the data is still being fully collected, but if we extrapolate from the flu studies, so there was a very important study published back in 2016 and basically it looked at the time of day of immunization against the influenza virus, the vaccine against the H1N1 virus, and it looked at

individuals in this case, around about 70 years of age. Now, individuals were either given the vaccine in the morning or in the late afternoon. If you look at the effect, how effective the vaccine was at generating an antibody titer, then in the morning, you got a titer of about 400, whereas in the afternoon, the titer was 100. So a huge difference on the basis of when you had your vaccination. I guess, if we extrapolate from the flu studies, then morning vaccination is probably going to be more effective than afternoon vaccination. There are some studies that have been published suggesting that is indeed the case. That can be complicated, though, because if you haven't slept immediately before or immediately after the vaccination, you can also hugely reduce its effectiveness. If we think about cancer treatments, there's an early study published way back in 1993 by Rivard and colleagues, and these are children with childhood leukemia. They were given a cocktail of drugs, either in the morning or in the late afternoon and early evening, and they looked at long-term survival over I think it was about four or five years. Those that had evening chemotherapy had about a 70% survival. Those that had the morning chemotherapy, it dropped to 35% survival. This is a massive difference just on the basis of the time of day. Other studies, for example, have looked at ovarian cancer. Bill Horesky, again for the United States, has done some really exciting work in this area, showing that two schedules, schedule A and schedule B, different times of giving the chemo, and it looked at survival over five years. One schedule, one timing had survival of 45%. Another schedule, the same drug, different time, survival had dropped to 10%. So same drug, same concentration, different time, 45% survival versus 10% survival. This is huge.

LuAnn Heinen  
So dramatic.

Russell Foster

It is breathtaking. I mean, this is a big effect. I suppose it goes back to your question, which is why isn't this becoming mainstream? I think the response is, look, it's difficult enough to schedule an individual to get their chemo or their radiotherapy at whatever time. Now, if we're going to have to do it at a particular time for a particular individual, this is just overwhelming for our health care services. We've talked about vaccination, we've talked about chemo, but I think another area where there seems to be some very interesting issues is in stroke. There's a 50% greater chance of having a stroke between 6 a.m. and 12 noon compared to any other time of the day. That is this dangerous window of stroke. Because it's so tightly timed, you can say, well, hang on, what can I do to reduce my chances of stroke? The strategy has been that many antihypertensives last in the body for quite some time. So by taking an antihypertensive before you go to bed, the antihypertensive is still around by that 6 a.m. to 12 noon danger window. As the circadian system drives up blood pressure, then the antihypertensive can counteract that. There's strong data suggesting that there's after 10 years, taking your antihypertensive at bedtime versus taking antihypertensive first thing in the morning, there was a drop in death rate of 50%, which is, again, huge. I think everybody thinks, well, the danger zone is between 6 a.m. and 12 noon, so you should take your antihypertensive first thing in the morning when you wake up. Trouble is, you're already halfway through the danger window and the time the drug has been absorbed and then kicks in, you're actually past the danger window, so it sort of makes sense. We're beginning to learn that different drugs at different times are going to have a really big effect.

LuAnn Heinen

Is this starting to take hold? Are there antihypertensives labeled for suggested evening dose or physicians or the NHS adopting policies like that?

Russell Foster

There are no clear policies at the moment. The advice will vary between different GPs. You may get completely differing advice. There is no standardization with this, so it's not there yet.

LuAnn Heinen

Let's talk a little bit about ideas for employers, particularly for those with shift workers, because you've suggested that there are things that could be done to alleviate some of the damage.

Russell Foster

I think so. If we think about, and we've touched on some of these, the loss of vigilance on the drive home, you know, those junior doctors crashing into cars in the early hours of the morning. Why aren't we downloading an app onto our smartphone, clipping it to the dashboard that can tell us if we're showing a head nod or the car is moving laterally and sets off an alarm? That's something we could do now. The poor physical and mental health associated with night shift work, we should be having higher frequency health checks to detect these problems before they become chronic. Higher rates of obesity, type 2 diabetes, metabolic abnormalities for night shift workers. Well, what's the food available for these individuals? We should actually be giving a healthy food option to our night shift workers. Fast food is not the option here. It's going to make things much worse. To my knowledge, and I think there's a really good marketing opportunity here, to develop a high protein, easy to digest snack for night shift workers, the healthy alternative when you're working through the night. It's worth pointing out that the divorce rate for night shift workers in some sectors can be six times higher than the same job during the day shift. Of course, what happens is that as we discussed, you're driving your biology outside of its normal range, your cognitive and emotional responses become decimated. Why don't we chronotype our workforce, so the late types go on the late shift and the morning types go on the morning shift. What you want to avoid, of course, is a late type actually being put on the morning shift, and at the moment, allocation is completely random.

LuAnn Heinen

As you've heard from Professor Russell Foster, the health issues brought about by circadian rhythm misalignment and sleep disturbance are extensive. Poor sleep has become a big problem for civilization. The World Health Organization has called sleep loss an emerging global epidemic. In this second half of today's show, we look more closely at sleep and its effects on human health.

Eti Ben Simon

We have mounting evidence that routinely sleeping less than six hours is associated with a host of diseases.

LuAnn Heinen

Eti Ben Simon is a neuroscientist and sleep researcher at the Center for Human Sleep Science at the University of California, Berkeley.

Eti Ben Simon

If you sleep less than six hours on a regular basis, you're more likely to develop cardiovascular disease, so have heart attacks or strokes, develop dementia down the line, sadly, be obese or have diabetes, and also suffer from impaired immunity. If you sleep deprive an individual just before they're getting a vaccine, and if you look at those individuals relative to people who have slept before the vaccine, they will generate 50% less antibodies.

LuAnn Heinen

Yes, that's stunning. 50% fewer antibodies when you've not slept well.

Eti Ben Simon

Yes, and we don't have to wait decades to really see these effects. Even if you deprive an individual of sleep for just one night, you start seeing these impairments in their physiological system one by one. Their glucose, their ability to regulate their sugar level in the blood is impaired. Their immunity is impaired. Their ability to sustain body heat, so even our ability to just keep warm is impaired when we don't get enough sleep.

LuAnn Heinen

Wow, now we're talking so much mental health. Sleep loss, I understand from your most recent research, has an effect on our emotions, our emotional regulation and our behavior. Can you speak about that?

Eti Ben Simon

Yes and it's actually a very relatively new field in sleep science. When we just started looking at the effects of sleep loss, we focused mostly on people's cognition, so how well they can learn things, how well they can memorize new information. Only in the past decade or so, we've also started asking the question, how does it make you feel if you have not slept enough? It's funny that we came to this only now, because if you ask individuals in the street, so you take let's say 1,000 Americans, and you ask them, what do you feel is most impaired when you don't get enough sleep? 85% would say it is their mood. If you deprive people of sleep for some of the night or all of the night, the most powerful outcome is a reduction in their positive mood and an increase in their anxiety. This is also mirrored in clinical populations as well. People that suffer from depression or anxiety, 70% of them would complain about their sleep. In fact, disrupted sleep is part of the diagnosis for both depression and anxiety.

LuAnn Heinen

Another note is that we intuitively know that sleep loss has an effect on our emotions and our behavior, because when we have small children and they're behaving badly, it's the first parental excuse.

Eti Ben Simon

Yes, yes.

LuAnn Heinen

Bad night's sleep.

Eti Ben Simon

I think all of my research can be summed up in what happens when you take away a nap from a child. There it's so obvious, but it's also the same when we're grown-ups. When you take away sleep from an older adult, they become anxious, irritable. They become more depressed, not motivated. We're really just starting to uncover the mechanisms in the brain and in the body that are responsible for this behavior.

LuAnn Heinen

Well, how might sleep loss then affect our relationships and our engagement interpersonally, including how it might play out in the workplace?

Eti Ben Simon

Yes, sleep loss seems to have a bi-directional impact on our social relationship. On the one hand, the individual who has not slept enough is less interested in social interaction and we keep seeing that individuals prefer to be alone. They prefer to spend less time with people if their sleep is poor or their sleep is disrupted. But what is perhaps slightly more surprising is that we're also seeing these effects from other people that come into contact with someone who's sleep-deprived. So people prefer to not engage with individuals who are sleep-deprived. Both sides of the social interaction are indeed affected by lack of sleep. We see it in romantic relationships. We see that there was a study done where they monitored 70 couples for two weeks. They monitored their sleep and also their relationship quality. What they found is that it's enough that one of the partners in the relationship did not sleep well that night for both of them to feel that their relationship is less positive and it has more conflict. They actually videoed these partners having a conversation and the poorer their sleep they had, the more conflict they had in their discussions

with each other. We're seeing similar things in the workplace too. In another study that they did in the University of Washington, which was really fascinating, they followed over 100 teams, so both the employers and the employees, and they looked at their sleep for two weeks. They found that if the leader of the team had poor sleep the night before, they were perceived by their employees as less charismatic. They were also more hostile to their employees and vice versa. The employees, if they had bad sleep, they were more hostile towards each other and towards their team leader. So sleep loss really penetrates our immediate social circle and its effect doesn't end in the individual. It really propagates forward.

LuAnn Heinen

Sleep isn't just rest. During deep sleep, your brain replays the day's experiences, transferring memories into long-term storage. It even prunes the unnecessary, leaving the important stuff sharp. In REM sleep, when dreams are most vivid, the brain may make unexpected connections, sometimes sparking sudden insights or creative breakthroughs. A good night's sleep is like a workshop for your brain. It removes harmful proteins, consolidates memory, regulates emotion, enhances cognition, and gives the brain an opportunity to form new neural pathways in preparation for the day ahead.

Eti Ben Simon

Sleep has a remarkable impact on learning and memory, so much so that scientists believe processing memories is actually one of the key functions of sleep. If you take individuals and you let them memorize a list of words, and then half of them stay awake and the other half are allowed to sleep, what you see in the next day when you ask them about the words that they have learned is that only those that have slept were able to remember a significant amount of that list. The people who stayed awake forgot a lot more. You can actually even do it with a nap. So a group comes in, they learn a list of words, some of them get to go to get a nap, the other read a book, and then you test them again and you see the same effect. The brain is failing at committing new information to memory without sleep. This is one of the main areas of research in sleep science, and we're now starting to see exactly how the brain is processing new information and when we are asleep.

LuAnn Heinen

Can I follow up on the creativity aspect? What happens to creativity when you don't sleep?

Eti Ben Simon

Yes, creativity in a way is finding new and novel ways to process information. What we're seeing is that sleep is not only helping us protect new information, it also helps us create new information. We have a lot of anecdotal examples of creative insights that came from sleep and specifically from dreams. The song *Yesterday* by Paul McCartney was first played out in the world to Paul McCartney's brain while he was dreaming. When he woke up, he was actually convinced that someone has written this song and he was surprised that it's a whole new song that his brain made up during sleep. We can also recreate these creativity tests in the lab. In 2004, there was a really clever study. They had participants performed this numerical quiz. You had to get to the right answer and the slow process would be by doing these seven steps that give you the right answer. But the researchers, they put a hidden rule in the quiz that if you figured it out, you can get to the right answer, but just two steps. Of course, they didn't tell the participants about this rule. They had them kind of try out the quiz. Again, half were able to sleep, half stayed awake. The next morning, they're asking them to do the quiz again. More than double the participants that were allowed to sleep were now figuring out the hidden rule. They figured out how to get to the answer in a much shorter time. That's relative to people who stayed awake either during the night or during the day. So there's something about sleep that not only lets us commit new information to memory, but it also uses that information in creative ways and gives us insights that were not accessible to us when we were awake.

LuAnn Heinen

In 1784, Benjamin Franklin jokingly suggested we could save candle costs by shifting clocks to make better use of daylight. In 1916, Germany was among the first countries to implement daylight savings time during World War I with the goal of conserving coal. The controversy over daylight savings time has been ongoing ever since.

Eti Ben Simon

The Monday right after daylight saving time, it's a Monday where we're all losing an hour of sleep because during the time we're asleep, the clock is shifted. The Monday right after daylight saving time has significantly more accidents than any other Monday of the year. It also has 21% more cardiovascular events, so heart attacks, relative to any other Monday of the year. We are seeing more and more negative impacts of that lost hour of sleep on public health. I think one of the reasons we're seeing that is because we're already very short on our sleep. In 1940, the average American slept 7.9 hours a night. From the 90s until today, that number is reduced to six and a half hours a night. We have lost in the past few decades, more than an hour of sleep. And I think it takes its toll on our health. When daylight saving time comes, we're shifted even more radically towards shorter sleep. I encourage canceling daylight saving time and I think that's the status of most sleep scientists. I think we can really find other creative ways of enjoying light or avoiding darkness other than just cutting our sleep short.

LuAnn Heinen

Well said, maybe we're ripe for a change.

Eti Ben Simon

Yes, absolutely. The discussion also is about which time zone we should actually keep. That's another interesting aspect because if we keep daylight saving time as permanent, it means that our biological clock and objective time or sun time is actually always going to be one hour apart. And that has a negative impact as well because it's almost like we're one hour jet lagged for the entire year. The conversation is also about which time we should keep, and standard time, what we do in the winter, is actually the time where the sun and our biological clock are more in sync.

LuAnn Heinen

So winter's best. Talk about any bedtime rituals, going to sleep rituals that we haven't talked about.

Eti Ben Simon

Yes, my advice for a bedtime routine is to allow for at least an hour of relaxing activity before we go to bed. Reading or having a bath or watching something that's not too arousing. It's actually something we do automatically for children, but we fail to do it for ourselves even though we need it just as much, if not even more, given our hectic schedules. Sleep is a spontaneous process and it's sometimes hard to summon. You can't just fall asleep at will, but you can help it by creating the right atmosphere, the right context. A calm and safe environment really welcomes sleep, so try to create that before bed. I know that many people use an alarm to wake up, but I would actually use an alarm to get into bed because if we get sufficient sleep, we wake up naturally. But detecting that we're sleepy at night, given technology and artificial light, is actually much harder because if something is too arousing, it can mask temporarily our sleepiness levels.

LuAnn Heinen

Well, isn't that why we use CBD or melatonin to help? I'm asking tongue-in-cheek.

Eti Ben Simon

You can, but you can also realize your own sleepiness levels if you allow for that relaxing routine. If your immediate surrounding before sleep is not too arousing, you would feel that signal that you're ready for bed. There was an article with the CEO of Netflix a few years ago where he claimed that sleep is the enemy of Netflix. They actually have this really annoying feature that you finish watching an episode, the next one immediately starts. The reason they do that is exactly to not give us a break to actually realize we're tired. I always like to close my eyes for a minute or two, and that really lets you detect whether you're ready for bed or not.

LuAnn Heinen

That's a huge tip, actually, that we don't really know how sleepy we are.

Eti Ben Simon

Yes, it's sad because I think it is something very natural, but it's just sort of drowned in a lot of technology or noise that is around us. That's why that routine of having a house that's a bit darker, more relaxing, there's nothing stressful going on that really can help you detect your sleepiness levels. Another tip that I can say is that if something is really stressing you out before bed, try writing it down. Try writing down the points. Try writing down what you think you can do or cannot do. But just getting it out there really helps embrace sleep because if you don't do it, the minute you go into bed, this is the first thing you're going to think about. Anything that can help you feel more relaxed and calm would really help you fall asleep better.

LuAnn Heinen

One takeaway from these conversations is a cautionary reminder. We evolved to be in sync with the Earth's rotation, the sun and the seasons, and to sleep for several hours while it's dark outside and to be awakened by morning light. Our bodies work best and stay healthier when we align our internal clock with the external by getting morning sunlight and keeping a consistent sleep and wake cycle. On this episode you heard Eti Ben Simon, a neuroscientist and sleep researcher at the Center for Human Sleep Science at the University of California, Berkeley. Professor Russell Foster is the head of the Nuffield Laboratory of Ophthalmology and director of the Sleep and Circadian Neuroscience Institute at the University of Oxford.

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