Smart Sleep: Unpacking Consumer Sleep Technology Transcript

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Introduction and Guest Welcome

Hello again, it's Dr. Wells, your host of the Sleep Deep Summit. New approaches in beating, sleep apnea and insomnia and next, I'm joined by Dr. Josh Lennon.

He's a physician board certified in sleep medicine and neurology. He's also assistant professor at the University of Tennessee Health Science Center. He's the medical director for their sleep lab there, which serves patients from all over the Mid-South.

And today he's here to talk with me about consumable, wearable sleep technology. And before we get started, I want to put in a disclaimer that neither Dr.

Lennon nor myself have any investment or any relationship with the technologies that we're going to be talking about. Welcome, Dr. Lennon. Thank you very much for having me.

Appreciate the offer. Yeah, you know, it's really interesting because I know we both get asked a lot of questions about these wearables that are like in watch form, there's ring form and there's even narrow bowls that you can put next to your bed and a lot of sleep apps.

So we're going to dive into this a little bit today with some questions that commonly come up from patients. And I want to start with the idea that, okay, I'm in the market for purchasing a wearable sleep tracker.

What kinds of things should I be looking for in terms of what I should buy? Yeah, great question. I think the first thing is really what's the motivation, right?

I mean, is the is the intent to get something just to track sleep or is the intent to get something extra with it?

Choosing a Wearable Sleep Tracker

So, for instance, a lot of the most commonly studied trackers are watches developed by Google, Garmin, the Pixel, Samsung, Apple. And so if you're in the market for a watch and you're also looking for some added features, like some information about your sleep or your sleep, tracking your sleep stages, things like that, then those I think, you know, are decent options to do that.

They also have all sorts of other non sleep features to them as well. If you're interested in something purely for sleep and this is where some of the miracles can be helpful, like the better the winding strip.

These are under the mattress sensors that do nothing except for tracking your sleep. You know, there's no extra bells and whistles with them just straight to sleep tracking if that's really just the intent.

Something like the offering is pretty similar in that regard as well, although it does offer a little bit more insight into things like daily rhythms based on your body temperature and circadian health and things like that.

And then there are the this whole other category of the the arables, which are these really software? They're not really in any sort of hardware. It's really just an app on your phone.

It uses your microphone or, you know, ultrasonic sound coming from the speakers and listening to to response to make some determinations about sleep for that really no added device that you have to get for something like that.

But again, that's really just for your your sleep alone. So really depends, you know, are you willing to shell out a few hundred dollars just for your sleep?

Do you want to spend a lot less money if you're going for something like just a software solution? Or are you really looking for something that's multipurpose, like an activity tracker that's going to check your steps and your heart rate across the day?

Your calories burned. It's a watch. It has other apps. You can talk like a walkie talkie with it. And you also also looking for a little insight into your sleep.

I think all of these are the factors. I think, you know, play probably a more important role in the selection of one device over the other. Yeah, it's a very personal choice, isn't it?

And I think there's a lot of things to consider. A question that I get asked a lot is how accurate are these things and how does that factor in into making a purchase?

Yeah, I think for me, the the question is really accurate compared to what? Right. I mean, our best understanding of sleep is this symphony of changes in the nervous system from neurons in your brainstem that turn on and off and they're communicating with the hypothalamus and the rest of the cortex, or there's just an extremely complex symphony of changes going on.

And you know, what we measure now as the gold standard sleep study in the clinical sleep lab is sort of the equivalent of, you know, standing in the overflow parking lot, hearing some rumbling on the ground, which is a lot different than actually being close to the stage in human music itself.

So the way that we measure sleep clinically is with electrodes placed all over the scalp, a noninvasive but still kind of bothersome way. And we have the sort of technological span role of using these 30 seconds segments of saying this is one stage and this is the different stage.

And it's really more of a holdover of, you know, older technology that we never even use any longer. And so it's it's almost kind of arbitrary. And, you know, it's sort of a wonder why we even stick with this kind of system when there are probably more interesting ways of saying what really is sleep in the white sieges and the medium stages and the deeper stages with things like the the odds ratio product or you know, a spectral analysis of these different frequencies were picking up from the scalp.

So, you know, all that being said, our gold standard is this from arbitrary, you know, set of stages, three stages of non-REM and one stage of REM sleep.

And so a lot of the consumer tech's technologies are being assessed against either subjective changes like a patient's or, I should say, a subject sense of how well they slept compared to a sleep diary sometimes compared to clinical grade act graphs or wrist worn devices have been around for for several decades that really measure movement alone to stage weight versus sleep.

And then most frequently against these clinical grade in lab polysomnogram or standard sleep study. And so all that being said, you know, accuracy is kind of all over the place.

How Accurate Sleep Trackers Are

So it really depends a lot on how the the device where we have multi-generation say like the Fitbit devices or the Apple Watch or, you know, the Samsung Galaxy watches, we can see some changes, some improvements in their accuracy over time, say from the early 20 tens, mid 2000, mid-teens over the last couple of years.

And how these things have improved and know the accuracy sort of depends on what exactly you're looking for. If you're looking at, say, just, you know, how well does it track whether I'm sleeping or not?

The accuracy is actually it's pretty good, right? It's typically in the low nineties, which is really not all that bad compared to, say, our Clinical Grade actigraph that we might use in a sleep clinic have an accuracy of at the mid-eighties, give or take.

So it's it seems to be more accurate at tracking wake versus sleep than something like that, which is really impressive. However, if you dive a little bit deeper and you really want to find out how accurate is it going to determine when I fell asleep versus when I was awake across the night versus when I woke up in the morning.

It really comes down to how are they assessing the accuracy here? So if I have a stopwatch and I say Go and you're about to fall asleep right now, and then I know that this is where I'm going to start making the assessments, the accuracy looks really, really good.

If I say, okay, it's getting close to your bedtime, I go ahead and you lay down and maybe it will just kind of see what time you fall asleep. And maybe it's 5 minutes, maybe it's an hour.

The accuracy of these devices kind of falls off pretty significantly, so really depends on how you're measuring it as well. If we look at sort of, you know, segment by segment minute by minute, how accurate these devices are, it also tends to look a lot poorer compared to if you just sort of sum up everything overall, especially as we started diving into sleep stages, you know, light sleeper, deep sleep versus REM sleep, the accuracy is kind of all over the place where we might say for the lighter stages of sleep, accuracy is probably, you know, mid-sixties, 2 to 70%, give or take.

Being able to accurately say this person is in a lighter stage of sleep for deep sleep in REM sleep, it's typically in the 50 to 60% range, which means you basically if I'm in deep sleep, there's kind of a flip of a coin chance that my device will accurately say I am in deep sleep or it'll say I'm awake and same in my sleep or something else instead.

So as we sort of get a little bit more finer green detail from these devices, that's when they tend to be a little bit less hopeful. And so I think that really matters a great deal as well.

If we look at some other features like, say, sleep efficiency, basically how much time was actually sleep in given this window of time where recording was happening?

It tends again to be a little bit more helpful. You know, they are pretty close within a few percent compared to a gold standard sleep setting. So I think that's helpful.

So the the broader view you take of your sleep, the more helpful, the more accurate these devices can be, the more detailed you try to get with them. And that's when they really start to be a little bit less helpful.

Yeah, so much good information in your answer. And I just want to make an attempt at summarizing what I'm hearing is three sort of tiers. So if you're looking at something broad like how much sleep a person got, these wearable devices which are on your wrist or on your finger night after night, are 90% plus accurate compared to an in lab sleep study, which is this point in time is the best measure.

But we're we'll probably even improve on that in the future. Second tier is sleep onset. When you fell asleep and when you woke up in the morning, they tend to be pretty accurate to determine that.

But in between, when these trackers are making a stab at whether you're in light sleep, in deep sleep or in REM sleep, that's when things start to get kind of nebulous.

And I feel like, you know, there's a lot of marketing efforts that go into these wearable devices. But I think you've given a really nice perspective on how to process the data that's coming out of it.

And, you know, one thing that I think is a factor is most of the time and possibly all of the time when this when these types of trackers are studied in populations of people to develop the algorithms that they use, these populations of people are not representative of the average person buying them.

In other words, they tend to be young and healthy people. Yeah. Which, you know, as a, you know, researcher, that sounds like the ideal population, right?

How am I going to make my product really look the best? And also depends on who do you think your market is, right? So if I'm marketing to someone who's going to shell out a few hundred dollars for a really nice accessory, you know, that might be a certain segment of the population.

Whereas, you know, my grandfather probably not going to pay for, you know, a Garmin watch or an Aurora or something like that. So I think that's, you know, in their defense, one caveat.

But, you know, you are right that most of well, I should say we don't really know what population they're basing their initial data on for these things to create their algorithms in the first place, because this is all sort of black box, you know, proprietary technology.

So we don't really have a peek behind the curve to know what is the offering doing versus the Apple Watch versus the Samsung Galaxy or anything like that.

When we look at the validation studies, most of the validation studies are done by third parties or from, you know, from university labs. And most of them are using, again, healthy young subjects.

So you basically take a bunch of college kids that want some extra credit or a few bucks in their pocket. And they'll do these studies to try to figure out, is this really accurate or not?

Some of the validation studies will also include a clinical population, which is, again, not necessarily representative of the general population or peers, people that are seeking out sleep care.

And here's you. Basically, people at the peak of their physical fitness and then you sort of mix those two together and hope that somehow that averages out to a typical, you know, American adult, which is not necessarily the case.

But we do see pretty significant discrepancies between sort of the ideal user versus people that tend to be a little bit less healthy. So if we, you know, some of these studies will look at sort of discriminating between, you know, a normal weight versus those that have a BMI that's higher than the 25 sort of consider overweight and obese.

And there was a slight difference in the accuracy between these two weight populations. You can also split based on those who either have normal or maybe mild disordered breathing during sleep versus those that have moderate or severe disordered breathing during sleep.

Who Wearables Work Best For

And again, when we start to see some discrepancy between those two and then most significantly, we as we see sort of the largest chasm between populations, are those that essentially have a normal sleep efficiency or basically those that don't have insomnia and those who are spending a lot more time awake when they are in bed, either on purpose or those who are struggling to fall asleep in the first place.

And what we tend to see, because when it comes to how accurate these devices are, they're pretty good at confirming when you are definitively asleep with the lack is confirming when you are awake because a lot of them rely on some combination of motion as well as the heart rate changes.

And when you are still in calm and resting but wide awake, these devices have really hard discriminating that wake that restful, weak state from sleep.

So the more time that somebody is spending awake, the less accurate the device has become. So for individuals with insomnia, we see that these the accuracy drops down, say, from 90 to 93% down into the low seventies.

For those that are so, you know, typical normal sleepers that don't have any trouble, like staying awake when they're trying to be asleep, that those individuals, we tend to see an accuracy closer to the mid-nineties or higher for these devices.

So there is there really is, you know, some some differences there between even just normal adults who might have different, you know, health conditions, whether it's sleep related or weight or anything else.

We also don't necessarily see these devices undergo any validation for older adults or for children or teenagers. And so, you know, if you've got, you know, a 14 year old at home who was hoping for, you know, his next birthday turn to get one of these fancy devices, you just keep in mind that the the numbers spat out from these apps about your sleep scores and this percentage of that have not been validated for that particular population doesn't mean it's not going to work.

We just don't have any data at least available to say whether that's accurate in a teenage population or if child compared to a normal adult. Likewise, if you are, you know, aging gracefully and you want to give a bit more insight into your sleep quality, we don't necessarily have any data to show that these devices are just as accurate in the 60 plus age group as they are in the 25 year olds.

You know, you are currently attending college triennial, but extra credit for, you know, involving getting involved with these studies. Yeah, it's so interesting because to your point, like people who are aging gracefully are seeing their non-REM three or slow wave deep sleep go down as a normal effect of aging.

This is one of the components of sleep that wearable devices purport to measure and I've had a number of insomnia. People with insomnia just come in and really get focused on that data and wonder, how can they improve non-REM three sleep or slow wave deep sleep?

And, you know, how can they take action based on what this information is telling them? How do you how do you advise people? Yeah. So one, when I trained, what we were taught is that, hey, this is just a byproduct of getting old, is that your sleep just was terrible.

And so you just have to expect that. And you know, there's been some information that's come out since then that essentially, you know, those those older studies that show a non-REM three or slow wave sleep or deep sleep, whatever you want to call it, declines, you know, precipitously with age.

It turns out that in that is based on clinical data. So it was, you know, patients, not normal subjects, sort of this difference between someone seeking medical care versus, you know, a normal adult that new patients were were demonstrating the sharp decline.

There was a paper that came out in the Lancet Respiratory back in 2019, a meta analysis of all sorts of controls across clinical studies over several decades, ensuring that basically, if you are not a patient, if you don't have a sleep disorder, that the change in deep sleep over time is actually really, really minimal.

Something like 1.3% per decade. So, you know, I think, you know, when we were trained, we sort of were told the wrong thing. So, yes, we do see a decrease of deep sleep with age, but if nothing else is going on, it really should be quite insignificant, you know, really should be quite small.

So typically, you know what we see day to day is that, yeah, there's a lot of people with insufficient deep sleep. Either this, you know, you know, non-REM three or the third stage, non-REM sleep or deep sleep or somebody or whatever you want to call it, as well as decreases in REM sleep.

And these have implications, you know, if that's actually true, you know, decreases in these particular stages of sleep are associated with all sorts of problems, from metabolic to mental health to cognitive and beyond.

And so if that really is true, then yes, I think, you know, individuals should be concerned. And so, you know, what can we actually do about this? Well, there's actually several things that can be done.

Improving Deep Sleep and Sleep Quality

So for the first, we need to find out what is possibly interfering with my normal development of these stages across

the night. And so this can be anything from, you know, a lot of medicines from some blood pressure pills to, you know, most medicines that people take, you know, for mood or anxiety, the medicines that we might take for pain.

There's all sorts of of pharmacological agents that can impact the depth of sleep and whether or not we can achieve enough or sufficient REM sleep as well.

That doesn't mean just because your REM is a little bit lower than you would really like to see that somebody's going to stop taking all your pills. It just we understand that this is there can be a direct effect of these kind of medications.

And so I think that needs to be taken into account and so before you stop any drugs you do talk to over the prescribers and find out, you know, what am I taking this for how long you have to take it, you know, what what timeline is there to, you know, make any adjustments if needed and if you really, really are concerned about the other effects of this agent on your sleep, is it try to find out.

Is there some substitution that we can make where I'm not going to have this kind of effect on? They seem to think looking for those kind of interferences, I think is helpful.

And again, being very cautious about making any sort of, you know, rash judgments about changing a medical regimen. Number two would be to look for things that you might be doing on a daily basis that could also be interfere with the normal development of these deeper stages of sleep across night.

And the two most common, I'm sure and know people during the summer are going to hear this in almost every single session in this this, you know, notorious notion of sleep hygiene with the two most common substances that we talk about, alcohol and caffeine, because both of these substances can significantly interfere with the normal development of deep sleep and REM sleep at night.

And I think, you know, one thing to keep in mind is that caffeine has a pretty long half life. And so just because you said, oh, it's been hours since, you know, my last espresso or since I've been chomping down on some chocolate, you know, the effect of caffeine, whether from an energy drink or coffee or tea or from from chocolate last for many, many, many, many, many hours.

So, again, this doesn't mean like you have to stop eating chocolate, doesn't mean you have to stop drinking coffee just to understand that these kind of substances can have an impact on the depth and quality of your sleep.

And if you really are concerned that your watch is telling you that you've not gotten enough deep sleep, that'll be one thing to look at is to find out how much caffeine am I getting across the day?

When am I getting the exposure to that caffeine? And is there a signifier enough interval between my last caffeine consumption and when I'm trying to go to sleep?

Because that can really interfere with things that I think sort of the other major thing that we see not as necessarily interfering with the development of deep sleep, but something that's sort of lacking potentially as we age, that's not necessarily there in younger adult years or even children, which is how physically active we are.

So we know that one of the biggest drivers of deep sleep specifically is how active we are, you know, how much removing, how much energy they were spending, you know, how active our brain is.

The more that our body is doing, the more and the stronger that drive to get sleep in general and deep sleep specifically becomes. And so as you know, as we age and we're retired and we're not, you know, commuting any longer, we're not running around the office or chasing around young children any longer.

We're just less physically busy and even if we're still engaged in a lot of things, but if we're just less physically busy, we're not creating the the physiological drive in the brain that would push us into these deeper stages of sleep.

So it's not just what is interfering potentially with our deep sleep, but what is it that we could be doing that should be pushing us into deeper stages of sleep that we might need to take a closer look at?

Yeah, great explanation. And I think that you've just given people to really actionable ways to increase slow wave deep sleep, which is increase the amount of physical activity, even mental activity during the day, and also take a look at caffeine consumption, which is so pervasive in our society, and just recognize that because of the long half life of caffeine, even if you are taking caffeine in the afternoon or evening, it could still be impacting your ability to get slow, wave deep sleep.

One of the ways that I kind of look at this is with the pendulum swinging, you know, in the daytime, you really want to increase your activity, your social connection, your light exposure, your mental effort, if you will.

And then as a result, when things swing the other way at nighttime, you'll be in those deeper stages of sleep. You'll have better ability to stay asleep throughout the night and wake up feeling refreshed.

So, you know, the amplitude of that pendulum has a lot to do with your sleep quality. Bring me back to my old physics days of, you know, potentially kinetic energy and translating between the two and activities are potential energy for sleep.

And your deep sleep is your actual kinetic energy for sleep. Absolutely. And I think, you know, if this is a concern for somebody, if you say, well, you know, whether I'm, you know, heard from somebody else or I use one of these things once and you're trying to figure out, you know, what is a potentially good tracker for me personally, you know, this I think this should be considered because if you say, well, all I care about is just my sleep, then, you know, say one of these near blows, or when absent is only looking at sleep, you know, could be a fine option.

But if you're trying to figure out, how can I there is a way for me to tie in my activity levels during the day, my heart rate changes during the day with the depth of my sleep or the quantity of deep sleep I'm getting at night.

Then a a wearable that you're wearing all day long, I think might provide a little bit more insight in that regard because they can get things like your step count and your burn calories and and things like that that you can use to try to compare, hey, on this day when I was a little bit less active, it looks like my sleep was not quite as deep or as plentiful as this other day when I was running around like a mad person all day long.

And then, you know, lo and behold, ended up, you know, sleeping like a baby that night. And look how much better it was on this night comparatively. So I think that kind of information, I think, can be helpful.

And so if if that's sort of one of somebody's concerns about their sleep, then, you know, a technology that you can involve activity tracking, not just sleep tracking, might be potentially more helpful.

Yeah, I love that too, because you've just named the two reasons why I think these consumer consumable consumer wearables are useful. They elevate sleep into our daily discussion and give us something to get feedback from.

And they're also tracking sleep night after night after night for the same person. So when you do enact a change, you might see that play out in the data that your wearable is is reporting.

I think they provide a little bit more context, say just an isolated sleep tracker alone. And so I think that's certainly one of the benefits. Absolutely.

Yeah. Are there differences between men and women when it comes to wearable devices? Yeah, that's a great question. I mean, one would think probably with the data that we have so far is that it really is negligible that and again, you know, these studies, they range from, you know, a couple of people to, you know, you know, almost 100 people.

And then we have meta analysis. We combined all the data together and look at them. But as far as we can tell,

there's really no significant difference in the accuracy for any one of the individual devices or software for men versus women.

And so I don't think that's necessarily be a factor to consider that, you know, this one actually only gained four men in this mission, only is on the women or vice versa.

And you know, for a lot of the the the wearable specifically in most them come in in a variety of, you know, colors, shapes, sizes, different bands, everything else.

Men, Women, and Device Differences

And so even if the actual sensor itself, you know, can't be swapped out, everything else about the look of it can certainly be more customizable. So it's not like you have to get, you know, generic black or have to get this one that looks a bit too feminine or this one looks a bit too masculine, that there are quite a lot of options for for most of these wearable devices.

Yeah, good points. I mean, that certainly was a factor when I was shopping for a wearable for myself, you know, what is the esthetic of the device. Yeah, you know, I want to kind of pivot a little bit and talk about miracles, which is, you know, kind of encompasses a smart bed and other things to measure your sleep, not wearing something on your person.

So first question, are smart beds worth it? It depends. The most unsatisfying answer. It depends. So, you know, smart beds come at a premium compared to your standard mattress box, bring your frame set.

And you know, if you look at your sleep as an investment, that might be worth it potentially. And it really depends on what you're trying to get out of your bed.

If the thing that you're really just trying to get is sleep tracking, it's probably a waste of money to spend that extra premium on a smart bed compared to just any other bed.

If you're really going for comfort.

Smart Beds and Mattress Sleep Tech

Some of the smart beds are really designed not smart, as in how well they are at tracking your sleep or predict or anything else, but smart in the sense that they can respond to your sleeping to try to improve it in the moment itself.

So for instance, do the common things that they might do is they might change the firmness level. So rather than just having a little remote in your dial in, you know, from 1 to 10, this is really stiff and this is really soft.

But ones that actually will adjust across the night, a certain degree of firmness when you're laying on your back, it can sense that you know, your hip is positioned, so now you're on your side.

So might adjust the firmness level slightly because of that position. Change that sort of adaptability, I think can be helpful to improve the comfort of the bed.

Because, you know, we are not just some, you know, static creature and we have a lot of dynamics with us and especially when we're sleeping and, you know, the firmness level that we find comfortable is going to change depending on what position that we're lying in as well.

So that can be quite helpful. They can also adjust the temperature across the night as well that you know, we might be a bit more sensitive to hot or cold at different times of the night, at different times of the morning.

Some can even use temperature as like an alarm. So you want to wake up, you don't want to wake up your bed, partner. You want something buzzing, vibrating, you know, making lots of cleaning noises so you can actually, you

know, to wake yourself up.

You can have your bed, crank up the heat and it's that extra heat in the morning on your side of the bed that that could wake you up. So those kind of features of smart beds, I think you're really interesting.

But again, that really comes down to is it worth getting a smart bed for sleep tracking or it's probably not. But if you want features of a smart bed that are really designed and intended to improve the comfort of the bed itself, not just, you know, does it feel good to lay down what you you do that little you know, you jump on the bed and and when these mattress stores to figure out can I do this or not but really is it going to adapt to me as well?

I think, you know, potentially some of these beds could certainly be worth it. Yeah, it's interesting because when you're talking about temperature being here in Minnesota in the wintertime, like having the temperature crank up as a signal for getting out of bed and being awake sounds heavenly to me.

And, you know, I think there's a word of caution here because we have some mattresses that can be adapted to, you know, to adapt the temperature to them.

There's also, you know, other devices that are worn like little slip covers, you know, to cover any mattress no matter who the maker is, that will circulate a fluid to adjust the temperature.

You know, as basically as a mattress cover. I think the issue there really comes down to uniform heating or cooling is not necessarily great for your sleep.

Right. You're sort of going back to this idea of, you know, the the being dead horse with sleep hygiene. One of the things that we usually will tell people to help them fall asleep is, you know, if you if you take a warm bath before you go to bed, that can really help you.

And when we say baths on purpose, right, we don't mean like you go clean yourself because you're dirty. Don't take a shower. I mean, lay in a tub of warm water because what that does is it takes all your peripheral blood vessels and dilates them.

Right, because you're in this really hot environment. So your skin says we're going to get rid of all this extra heat. And so we dilate all the peripheral vessels as we're trying to dump heat away from the body into this into the into the water cells.

And then once we get up, because we've been preheated, essentially, it's really easy for all the heat from the body to escape to our course or skin and everything else.

And so we can cool ourselves down by setting ourselves up first, in contrast to what we see is that if you take somebody who's at sort of their normal temperature, normal blood dilation levels and you put them on a cooling surface, basically what happens is all the blood vessels on the skin start to constrict down. Right?

Something is called we say we don't want to lose all that heat. And so we basically try to retain heat. And what you end up doing is you kind of prevent the core body temperature from dropping down, which is sort of the main signal to one of the main signals to fall asleep in the first place.

And to achieve a deeper state of sleep is by cooling down the core body temperature by a few degrees at peak across the night. And if you're just laying on it on a and on a bed of ice, then basically what you're doing is going to constrict all your blood vessels and retain more heat than you really ought to.

And so this is where, you know, wearing heavy socks or layers of socks can be quite helpful. You wear mittens and socks in the bed because you don't want to lose heat through your hands or feet or forehead.

You just want to lose heat from the core. So that can be kind of helpful some of the smart beds have rather than just, you know, uniformly the whole bed changes temperature.

It might change really just in the center and then down where your feet are lying, it might actually heat it up. So you might have a a a wider temperature differential between your extremities where you don't want to be losing too much heat from in the core, where you want to kind of cool things down and you don't necessarily get that with a lot of these mattress cover coolers, even though the idea is right or the idea is cooling your body temperature down, improves sleep, it helps you fall asleep faster, you get better, deeper sleep.

But the method matters a lot as well. Yeah, it's so true. And I think that one of the, one of my favorite tricks is the baths at night and explaining to people how that works to pull down the core body temperature sometimes, you know, speaking personally, if it's time to go to sleep and my feet are cold, cold feet equals no sleep.

And so sometimes a heating pad or like one of those microwavable rice. Yes. Pillows can be really helpful for that. Absolutely. You know, we've really just learned.

Yeah. Or a smart bed. Yeah. Yeah. I'll have to start a little bit of a savings account for for that. You know, we really covered a lot of ground here with wearables and miracles.

And I think there's some great actionable advice for anybody who wants to better interpret the data data that they're getting. You know, sleep stages are not quite as accurate as we'd like at this point, but still paying attention to your sleep, watching that information on a daily basis can results in positive behavioral change.

And that's why I would hope for people who are interested in this in this topic.

Closing Remarks and Where to Learn More

Dr. Lennon, as we close down, I, I want you to tell people where they can learn more about you or even work with you if they're interested. Yeah, sure.

So you can find me at wellrestedmd.com, and I've got a podcast. I've got a course on cognitive behavioral therapy for insomnia. If you want to work with me professionally, you know you're in the Mid-South area, you know, come and find us our practices called the Neurology Clinic Sleep Center.

And we're located in Memphis, Tennessee. And we'll be happy to see you in that way as well. Fantastic. Thank you so much for speaking with us today. My pleasure. Thank you so much. Dr. Wells.