

## Your Complex Brain - Season 3 Episode 10 - The Health Risks of Undiagnosed Sleep Apnea

Carmen Chu 00:02

[Your Complex Brain theme music] When I'm driving to work, which is in an hour to an hour and a half drive from home to the office, I would have to make one to two stops throughout that time, just maybe parking in a side road to take a 15- to 20-minute quick nap so that I can continue this journey back home.

Heather 00:22

[music continues] This is Your Complex Brain, a podcast all about the brain, the diseases that impact it, and the path to finding cures. I'm your host, Heather Sherman, and I have the great pleasure of working alongside the team at the Krembil Brain Institute in Toronto, Canada, a leader in brain research and patient care. In each episode, we'll take you behind the scenes into our clinics and research labs to meet the game-changers of the future. We'll empower you with the latest research to help you take charge of your own health. You'll also hear from people who are living with brain disease, as well as their loved ones and the care teams who support them. Join us on a journey to unravel the mystery of your complex brain. [theme music continues then fades out]

[gentle lullaby music] [loud snoring] Sound familiar? Loud, disruptive snoring could be a sign of sleep apnea, a common condition in which breathing may stop and start many times throughout the night. [snoring] You may be aware that sleep apnea can disrupt your sleep and cause fatigue, but did you know that it can also impact your heart, your brain, even your sex drive?

[lullaby continues] Today, we're going to discuss the health risks of undiagnosed sleep apnea and why, if you're having trouble sleeping or staying awake during the day, if you're experiencing morning headaches, mood changes, or have difficulty focusing on tasks in your workday, you should consider getting a sleep test.

Carmen Chu is sure glad she did. Carmen credits a sleep apnea diagnosis and subsequent treatment for changing her life. Here is Carmen's story. [lullaby ends]

Carmen Chu 02:21

[bubbly electronic music] My name is Carmen Chu. I am currently 43 years old. I am a cancer survivor and I live with my husband and two children up in Markham. I work as a fundraising professional in one of the downtown hospitals. I've been diagnosed with sleep apnea, earlier this year in March.

I was diagnosed with stage 2 breast cancer in March 2022 and, for the remainder of that year, I was going through some active treatments including radiation therapy and two procedures. And so, in the year of 2023, it was really a year of quiet treatments, but also a phase of going through several symptoms and also going through menopause, as well. And, throughout that year, I've had weight gain, I've had hot flashes, muscle aches, and interrupted sleep and, by late December in 2023, I've raised the concerns to my family doctor and he has asked me to go through a sleep test and to see a respirologist to see what can be done to increase the quality of my sleep, and I've gone through a sleep test in February.

After my physician has prescribed the requisition form for me to do a sleep test, I would pack my bags and I would be in my pajamas, and I would go into this test clinic and be there for the night.

And, before I go to bed, or before I go to sleep, they would have monitors hooked up onto several parts of my body, both in my head, my arms and my legs, and to my heart, and these are monitors to test the times that I have stopped breathing or there are changes in my heartbeat or in the movements of my body.

And so, I would be there maybe from 9 o'clock at night until the 6 o'clock in the day. There would be dedicated personnel monitoring throughout my night, in terms of my movements that I have or, you know, significant changes to my body while I sleep at night. In fact, I had my very first sleep test almost 12 years ago in 2011 and, at that time I had asked for also help to get better sleep, and back then, the test results came back that I was actually mild and not in a stage where it needs active treatment.

However, I know, with life changes, with having two kids, I've changed actually two jobs throughout those years, and you know, obviously with cancer treatments and with symptoms that I'm managing this time around, I notice very much that my sleep is very interrupted and, even when I do feel like I have sleep, I don't actually feel energized in the morning and it has deeply affected my work life, my family life, and also just keeping up with my daily activities.

Before going to my family physician, I have repeatedly experienced just, like, really fatigue and, for example, when I'm driving to work, which is approximately an hour to an hour-and-a-half drive from home to the office, I would have to make one to two stops throughout that time, just maybe parking in the plaza or a side road to take a 15 to 20-minute quick nap so that I can continue this journey back home. [music fades out]

[laidback electronic music] It is not just the naps that's bothering, but it's trying to just focus on work, and you know that you have to really focus in, you know, working with numbers or seeing a client, and just not having that energy or the quality rest the night before really impacts work life, but also how I manage work, as well. So, there are a few facets that I feel like, you know, that sleep is so important, and when I did not get that sleep, I really needed to seek professional help.

I think, as working moms, getting quality sleep is a challenge to begin with, but especially for my case because I had gone through, you know, different stages in terms of my treatments and symptoms. The menopausal effects really have taken on a toll because I was navigating both what menopause is like, but also what the recovery of cancer would be like. So, having, you know, several factors come into play and just not knowing what I can do to get better rest was a challenge. I think, like, we don't have the education we require to know what this quality rest or quality sleep is like, and what does it feel like to have good sleep? [music fades out]

[gentle electronic music] In March 2024, after doing the sleep test, my respirologist has said I have severe sleep apnea and her recommendation was that I would have to use a CPAP machine, and since then I have started using the machine and I have truly seen the benefit of that device. It is a device that I connect to my nose and it has oxygen fed to me, and it is actually customized, based on the results of my sleep test. It took me about two weeks to really adjust to sleeping with the CPAP machine, and after that, I have experienced, you know, uninterrupted six to seven hours of sleep at night.

It is very transformational because I feel very energized. I feel the difference. I can actually focus on work. I actually have the energy to do exercise, and that difference with good quality of rest leads to a much better outcome in all the other things that I can do during the daytime. So I highly

recommend it to those who can benefit from it. I think this can be helpful to a lot of people that are young or old in different stages of life, as well. [music fades out]

[rhythmic electronic music] I think for my family that, you know, for my kids, they see that I wear this, you know, funny headset on my head when I go to sleep. They would query whether this would be, you know, hurtful in any way, and I assure them that it would not be. But, particularly, I feel like I'm an ambassador for the CPAP machine now because I feel like, you know, families of mine or my husband could really use it as well because I noticed the snoring from his sleep, and these are all early signs of sleep apnea, and so I want to set an example to him that, you know, go get treated or at least get seen by a professional, whether you need one. And, if you do, I think this could be very helpful, not just on the energy and on the daytime activity-wise, but good sleep leads to better heart health, better brain health and you're just like brighter and just, you know, healthier because, from what my respirologist has been telling me, when our body is at rest, your heart also goes through the sleep that it needs to, and the rest that it needs and, in particular, our brain, right? Because our brain instructs everything that we do during the day, but also at night. So, getting that good quality of sleep really helps our brain to get the rest that it deserves. [music fades out]

[delicate electronic music] I think, once you have the rest that you need, people around us can feel that, you know, you have more time and energy to spend time with them, going out with them, or doing exercise, or doing other fun activities with them. So, I think all that is good and needed benefits for everybody and not just you know, those who struggle through certain phases of recovery, but just any normal person and, in a way, particularly women because there's a lot on their plate at all times. [music fades out]

[bubbly electronic music] Ever since I've had the professional advice and I was diagnosed with sleep apnea with the CPAP machine and with the support that I needed to use the machine properly, I think I'm a brand-new person in many different ways because I think I am much more energized during the day, I can bring in positive energy to my colleagues and my friends, but also, you know, I can actually focus on the things that I want to focus on at certain times of the day. I wouldn't be so distracted. I can drive safely on the road and keep my well-being safe and happy. So, those are the few things that I feel the biggest difference in terms of properly treating the sleep apnea and not ignoring it or neglecting it.

I think being diagnosed but also getting the treatment I have for sleep apnea has changed my life because I feel like I have gained so many more hours in my day that I can do what I want to do, so definitely it has changed my life. [music fades out]

Heather 11:40

[gentle electronic music] Later in the podcast, I'll be joined by Dr Frances Chung, an anesthesiologist and clinician investigator with UHN's Krembil Brain Institute, and the inventor of a new screening tool for sleep apnea that's being used around the world. But first, I'd like to welcome Dr Douglas Bradley, Director of UHN Centre for Sleep Health and Research at Toronto General Hospital. [music continues then fades out]

Thanks so much for being here today, Dr Bradley.

Dr Douglas Bradley 12:10

It's my pleasure. Thank you for asking me.

Heather 12:14

Of course. So, today we're going to be speaking about sleep apnea, which I think most people have probably heard of, but no one ever thinks that they have, right? [chuckles lightly] So, what is sleep apnea and how do you know if you have it?

Dr Douglas Bradley 12:27

Well, sleep apnea is a disorder in which the tongue falls against the back of the throat when you fall asleep and blocks your breathing. In order to start breathing again, you have to wake up, and you wake up because of the drop in oxygen which alerts the brain. You wake up, you open your mouth, you start breathing again, usually with a loud snore. And, how do you know you have it? Well, first of all, it's almost always associated with snoring. Secondly, you may wake up gasping or choking. Thirdly, your bed partner may say they see you stop breathing. Of course, you may feel groggy in the morning or have a headache in the morning. And finally, being sleepy and tired during the daytime and falling asleep in situations where you shouldn't like driving, so it's associated with a marked increase in motor vehicle accidents because of falling asleep at the wheel. And also, say, falling asleep while you're watching TV or while you're just sitting resting or reading. Those are the classic signs of sleep apnea.

Heather 13:24

I think snoring is probably the best-known symptom, but just this feeling of fatigue, as you mentioned, that sort of pervades your entire day, that's something to watch out for.

Dr Douglas Bradley 13:32

Absolutely.

Heather 13:34

Okay, so I want to ask you about the biology of what's happening. You talked a little bit about, you know, what's happening during the actual sleep apnea episode, but what's happening biologically in our body and in our brain?

Dr Douglas Bradley 13:46

Yeah. Well, of course, when you stop breathing during sleep, your oxygen levels go down and the brain doesn't like that. The brain requires a very high level of oxygen to function normally, and if it keeps going down all the time, what happens is you have an impaired executive function. That means you have an impaired ability to make high-level decisions. So, you're not as fast, you're not as good with names, you're not as good with numbers. If you have a situation where there's multiple factors, going into a decision, you often make the wrong decision. So, you get what we call brain fog. So, it's related to the lack of oxygen and the intermittent rise in blood pressure.

So, when you lack oxygen, your blood pressure goes up, and during sleep, ordinarily, your blood pressure drops by about 10 to 15%. In cases of sleep apnea, it tends not to drop or to drop by less than 10%, which means your brain is being exposed to high blood pressure, and the combination of that, plus the lack of oxygen, generally causes some mental impairment.

Heather 14:49

And I think a lot of people, when they hear sleep apnea, they associate it with snoring, so today's episode is all about giving people the information that they need to know and understand about the health risks of undiagnosed sleep apnea. Can you tell us a little bit about that?

Dr Douglas Bradley 15:01

Well, in terms of stroke, sleep apnea is a significant risk factor for stroke. In fact, we wrote one of the first papers on this, demonstrating that risk. However, there's no evidence so far that treating sleep apnea will prevent a stroke. What we have done, though, is a randomized trial where we took patients who had a recent stroke and were admitted to a rehabilitation facility at Toronto Rehab Institute within about two weeks of their stroke. We did sleep studies, and then those with sleep apnea, we randomized them—that is, we tossed a coin and half of them got treated for the sleep apnea, half them didn't, for a month—and then we tested their cognitive abilities, their mental abilities, and their motor function, and their activities of daily living.

What we found was the group who was treated had a better recovery from the stroke, most particularly their motor function. So, that meant that, for example, they could walk better, they could do the activities of daily living better, and they basically were more functional.

In terms of the mental side of things, they did have some improvement in their executive function, but overall there wasn't much of an improvement in their cognitive ability. So, the main improvement we saw was in motor function and, for people with a stroke, the most limiting disability is motor function, and so, from that point of view, treating the sleep apnea improves the motor function of people who otherwise might have been more disabled than they were.

Heather 16:27

Interesting. So there's a direct correlation between treating the sleep apnea and, in this particular instance, stroke, but that must be applicable to other acute conditions, as well.

Dr Douglas Bradley 16:37

Well, we don't know because they haven't been tested. We've just received a grant to look at what treating sleep apnea in patients with early dementia will do. Our hypothesis is that it may slow the decline in mental function that is the hallmark of dementia. We haven't started the trial yet, so it's too early to say whether that's true or not, but that's the hypothesis.

Heather 17:00

That's incredible. The number of people who have sleep apnea, according to the latest statistics, is more than 20% of Canadians. It's huge. But, the number of people who appear to be at risk is even higher, so how would you even know if you're at risk? Who do you look at from a patient population?

Dr Douglas Bradley 17:18

Men are about three times as likely to have sleep apnea than women. We don't know why, but that's the case. So, in my clinic, I see about three times as many men as I do women, and that's just a reflection of the epidemiology of it. So, women seem to be protected from it. In men, obesity is the most important factor. In women, interestingly enough, obesity is important, but age seems to be more important. [gentle electronic music] So, there is some increased risk after menopause—again, we don't know why—but that seems to be the case. So, in my clinic for example, I have a lot of slim women in their 70s and 80s who have sleep apnea, but very few men who are slim and have sleep apnea, so there's a bit of a difference between men and women and how it presents.

The other thing is that women tend to have headaches in the morning much more than men do—again, we don't know why—whereas men tend to be sleepier than women. So there's a little bit of a difference between how they present, but the call mark really is having a bed partner. So, if you don't have a bed partner, you don't know if you snore, you don't know if you stop breathing, you don't know if you're tossing and turning all night long. If you have a bed partner, they'll say, "Hey,

you're snoring," or, "Roll over," or, "I see you stop breathing during your sleep." So, not having a bed partner is a risk factor for not getting treated because you don't know you have it. Whereas, if you have a bed partner, you're much more likely to be diagnosed. [music fades out]

Heather 18:36

Interesting. When it comes to the diagnosis of sleep apnea, I mean, the traditional one would be, I guess, the sleep clinic where you would go and you would be assessed for a night. But, there's also a lot of other innovations and diagnosis and treatment. Can you tell us about some of those?

Dr Douglas Bradley 18:48

Yeah. In terms of diagnosing sleep apnea, there's been a huge shift in the last 5 to 10 years. So, traditionally, patients have to come into a sleep laboratory and spend the night there, and it's quite inconvenient and it's very costly. You have to pay a technician to be there all night long, you have about 14 electrodes attached to you, and it's just very inconvenient and uncomfortable. So, more recently, home sleep testing has been developed during COVID because people couldn't come into the hospital and couldn't come into the sleep laboratories. There was a huge shift from almost no testing at home to 55% of all sleep studies being done at home now.

In Europe, the percentage is 70%, so there's been a major shift from in-laboratory testing to home testing, which of course for the patient is much more convenient and much more natural. The number of electrodes that are required is far fewer and it's much cheaper, of course, because you have to pay a technician. It's much more economical to do it at home and it's much more accessible.

Heather 19:47

[driving electronic music] We talked about some of the risk factors including hypertension, stroke, heart failure, and some of those types of health risks, and you're looking at some new research around Alzheimer's and neurological conditions. Bottom line, what do you want people who are listening today to know about the undiagnosed health risks of sleep apnea, and why they should be tested?

Dr Douglas Bradley 20:07

The main thing is we're really treating the symptom of excessive daytime sleepiness, morning headaches, restless sleep, and nocturnal choking or shortness of breath. We know that, if we treat sleep apnea, those get better, and there are many people who come into my office after they've been treated and say, "You've given me my life back again. I'm awake. I'm not in a fog all day long. I can drive a car. I can speak to my wife. I don't fall asleep during dinner." So, what we're really doing is we're improving people's quality of life and in some instances it's very dramatic.

In terms of reducing cardiovascular risk, we don't have that evidence. We have some evidence that treating sleep apnea will lower blood pressure, but we have very powerful drugs to do that without treating sleep apnea, so the evidence, so far, from randomized trials, is that treating sleep apnea doesn't reduce the risk of having, for example, a heart attack or a stroke or heart failure or sudden death. But, what we do have from a trial I just completed which involved 731 patients in nine countries with heart failure and sleep apnea, we found out that treating the sleep apnea didn't reduce the risk of death, didn't reduce the risk of recurrent hospitalizations for cardiovascular reasons, but what it did do is it caused a dramatic improvement in sleep structure and in symptoms. [music fades out]

So patients, for example, with heart failure, often feel short of breath; they are limited in their exercise capacity. That improved. They often feel fatigued – very fatigued. That improved

dramatically. So, in these particular patients with heart failure and sleep apnea, treating their sleep apnea vastly improved the quality of life but did not reduce the risk of death or of having another cardiovascular event.

Heather 21:51

Dr Bradley, we're talking specifically about sleep apnea today, but in general, you know, with our busy lifestyles and everything all of us have going on, sleep is often the first thing to go in those busy schedules. How important would you say overall healthy sleep, sleep hygiene is for people's overall health?

Dr Douglas Bradley 22:11

Well, that's difficult to say. I think we're actually sleeping probably pretty well. Now, the amount of sleep we get apparently has gone down about an hour in the last 50, 60, 70 years, but the issue is, back then, we didn't have objective measures of how people sleep. Now, we do. And so, the whole idea, for example, that you need 8 hours of sleep is nonsense. Most people sleep about 6-7 hours—most adults. You sleep more when you're a child and when you're a teenager— a lot more. But, as an adult, you're sleeping usually 6, 7, 8 hours. 8 hours though is not a target. Many people get by in four or five hours. It just depends on your particular physiology, and there's no way to predict that.

Again, I'm not trying to say you shouldn't sleep [chuckles] or sleep's not important. Clearly, it is very important. But, for an individual, there's a wide range of what constitutes a normal sleep pattern for them, and what constitutes enough sleep to make them function properly.

Heather 23:10

[gentle, upbeat electronic music] Exactly. It all comes back to how it impacts you during the day. Is there anything, Dr Bradley, that I haven't asked you or anything you'd like to add?

Dr Douglas Bradley 23:17

Well, I would just say this – we are under-diagnosing sleep apnea by about 85%, so what that means is that, out of 100 people who have sleep apnea, only 15% are being diagnosed, and the reason for that—and particularly in Ontario—is we are not doing enough home testing. So, there are many people who could benefit symptomatically from being treated for the sleep apnea, who are not getting diagnosed and not getting treated. And again, the solution for that is to have more widespread home testing.

Again, right now, for example, if you have high blood pressure, you go to your family doctor, they use a blood pressure cuff, you're diagnosed. It's simple, right? It doesn't take a lot of time. It doesn't cost a lot of money. With sleep apnea, having to go to a sleep laboratory, with the costs and the inconvenience, it's a barrier, and I think we need to breakdown that barrier and get home testing done, and the simpler, the better. This is a public health problem that is not being addressed adequately right now and the way to address it is to increase accessibility to testing, which means home testing.

Heather 24:19

Thank you so much, Dr Bradley. Thanks for being here today.

Dr Douglas Bradley 24:22

My pleasure. Thank you for having me. [music continues then fades out]

Heather 24:29

Dr Frances Chung is the ResMed Chair in Anesthesia, Perioperative and Sleep Medicine Research at UHN. [gentle, upbeat electronic music] She is also the Co-Founder and past President of the Society of Anesthesia and Sleep Medicine. In 2023, Dr Chung was honoured as UHN's Inventor of the Year for the STOP-Bang Questionnaire, a screening tool she developed for sleep apnea. Dr Chung, thank you so much for being here today. [music fades out]

Dr Frances Chung 24:58

Oh, thank you very much for inviting me.

Heather 25:02

Well, before we get started, I wondered if you could clarify for us one thing, which is what is the difference between obstructive sleep apnea and sleep apnea?

Dr Frances Chung 25:11

So, essentially, most people just refer to obstructive sleep apnea as sleep apnea. It's easier to remember. It's two words instead of three words. But, when you talk about sleep apnea, it can be different types of sleep apnea, as well. So, it can be obstructive sleep apnea, which almost always involves the upper airway, or it can be central sleep apnea, which may involve something in the brain and is usually related to opioids. So, there are different types of sleep apnea.

Heather 25:45

Thank you. I'm curious... as an anesthesiologist, how did sleep apnea even become an area of interest for you? What were you seeing in the OR, in the operating room?

Dr Frances Chung 25:56

So, 80 to 90% of the people having sleep apnea, they do not know that they have sleep apnea.

Heather 26:04

Wow.

Dr Frances Chung 26:04

And, in males over 45 years old, one in five may have obstructive sleep apnea, and in females, one in nine may have obstructive sleep apnea. So essentially, when patients come to have surgery and see the anesthesiologists in the pre-op clinic, often, they do not know they have sleep apnea, and even if they know they have sleep apnea and they are recommended to have CPAP as a treatment, 50% of them do not like their CPAP so they say, "I'm not using it. It's not comfortable. I'm non-complying with my treatment." So, I'm seeing these patients when they come to the OR often enough, they are a bit obese or a little bit big on their size. Their neck is a little bit thicker and they are more difficult to manage during the operation time and after surgery.

Essentially, after surgery, when these patients are being treated with pain medications such as opioids for their pain, it could result in low oxygen level. These patients could have issues of really low respiratory range and lower oxygen level, and so it could result in not-so-good an outcome for these patients.

So, that is why I'm interested-- and also, these patients are very interesting. They will say, "I have a lot of pain," and when you give them some pain medications a little bit, they become very drowsy and sedated. And, as soon as they wake up, then they will say they have a lot of pain. So again, it's a vicious circle because they have a lot of pain, you have to give them medication, they become very



drowsy, they become sedated, which is not good for their upper airway because they can get obstructed when they are sleeping.

Heather 28:02

[light music] So, there are a lot of impacts from a critical illness perspective, especially when you're seeing people in the operating room during surgeries. I know you also mentioned that you see cognitive impacts, as well. So, what would you see on that front?

Dr Frances Chung 28:13

Actually, I think it is very interesting in terms of cognitive impact. I'd like to talk about overall the cognitive impact as well, and not as a result of sleep apnea, but in general. Again, we are having a great tsunami; a lot of people are coming for surgery. They are 60 or over 65 years old, and we are talking about, you know, 17 billion people in North America older than 65, and over 50% of them will have surgery. But, they account for 50% of the complications, and we often hear families of patients, they complain, "Oh, grandmother"—or grandfather—"is not the same anymore after their surgery." And actually, I have a personal experience. [music fades out]

My sister-in-law lived in Matalan. She had cataract surgery a number of years ago. For three months after her surgery, she said that she had brain fog. She cannot remember which is her spice cabinet in her kitchen for a few months. So actually, a new study recently was presented and they did-- on 4,200, people, they found people with sleep apnea may have 50% increase of memory, of thinking problem, compared to those with no sleep apnea. It is not very clear if sleep apnea directly caused this attention and memory problem, or is it related to their other medical diseases like diabetes, cardiovascular diseases? Because, often patients who have obstructive sleep apnea, they often have cardiovascular disease and diabetes, as well.

But, the scientists suspect that the intermittent drop in oxygen when they are sleeping and the lowering in blood flow and the inflammation in the brain seen in the people with sleep apnea may impair their cognitive function. And also, what happened is, in sleep apnea people, they have interrupted, poor-quality sleep because they get obstructed and the brain is very smart and not having oxygen. And so, they will be aroused, and so they wake up quickly and then they breathe, and then they fall asleep again and they get obstructed again. And these cycles repeated themselves.

And, when you have a good night's sleep, it allows for repair and restoration of the brain function. You feel good when you wake up, and the brain has a very specialized cleaning system called the glymphatic system, who gets rid of these wastes that accumulate during the day, and this system is activated only during deep sleep. Without this high-quality sleep, the obstructive sleep apnea people, they don't have this high-quality sleep and the brain doesn't get the opportunity to rest and repair. And therefore, it may lead to memory loss, attention loss, or cognitive impairment.

Heather 31:32

And so, that leads us to the development of your award-winning STOP-Bang Questionnaire, this innovation that you've come up with to help screen for symptoms. So, tell us about it. What is the STOP-Bang Questionnaire? What does it stand for?

Dr Frances Chung 31:44

So, the STOP-Bang Questionnaire is a widely-used screening tool in the world for obstructive sleep apnea. It is designed to be a very quick and simple way, a bedside way to identify individuals at high risk of sleep apnea. And, the acronym of STOP-Bang, the S stands for snoring. So, it has to be loud.

Do you snore very loudly? It has to be more than 50 decibels, so it's loud enough to be heard behind closed doors or your bed partner will elbow you for snoring at night.

And the second one is T, is tired. So, do you often feel tired, fatigued, or sleepy during the daytime, such as you fall asleep during driving, or you actually fall asleep when talking to someone? And, O represents observed. Has anyone observed you stop breathing or choking and gasping during your sleep? And, P represents pressure – blood pressure. Do you have, or are being treated for high blood pressure?

And, B represent BMI. Is your body mass index more than 35 kilograms per meter squares? And actually, it means you can input your height and weight into any website, or we can do it on our website, stopbang.ca, and it will calculate the height and weight into the BMI for you.

A, representing age. Are you older than 50 years old? And, N representing neck size. Measure around the Adam's apple. So, is your neck circumference around 16 inches or 40cm? It's very easy. If you put your two hands and you put a choke hold on your neck at the Adam's Apple and if your fingers do not meet, that means you have quite a big neck and is greater than what is 40cm or 16 inches.

Heather 33:49  
I'm doing it right now.

Dr Frances Chung 33:51  
[bubbly electronic music] Yeah? [laughs] And G, are you male, right? The male sex, you know. So, how does this sleep apnea score work, in terms of stopping? So, each positive answer scores one point, and the total score ranges from zero to eight. The higher the score, the greater the risk of sleep apnea. So, if you score zero or one or two on these questions, you don't have sleep apnea. But, if you score three or four, then you may have some risk or intermediate risk of sleep apnea.

But, if your score is five, six, or seven or eight, it is more likely that you would have sleep apnea, so a STOP-Bang score of five, the probability of having moderate to severe sleep apnea is about 40%. A score of six, probability is about 50%, and a score of seven, the probability is about 60%. You have to remember that this is a screening tool. It's not a diagnostic tool, so you still, once you suspect that you may have sleep apnea because you may be at risk, then it's advisable that you see your family doctor and then you get evaluated further. [music fades out]

Heather 35:13  
Okay, the STOP-Bang questionnaire, that's great. You mentioned earlier that there were between 80 and 90% of people that don't even realize that they have sleep apnea. So, how effective is this questionnaire in terms of actually diagnosing for sleep apnea?

Dr Frances Chung 35:28  
So, the STOP-Bang Questionnaire is a reliable and valid tool for screening sleep apnea, and even NASA has asked UHN for permission to use it when they recruit astronauts.

Heather 35:42  
Really?

Dr Frances Chung 35:42

Yes. It's very interesting. And, it is being used in many countries in the world, especially in the pre-op clinic in the hospital in North America and Australia, New Zealand, in England, and many other countries. And, essentially, by doing this, they can identify a patient who may be at risk, or at higher risk of sleep apnea, and then the health care team can manage and tailor their anesthesia to these patients and they may actually monitor this patient and they can adjust and manage them better.

The sleep clinic does use them, as well, so they are identifying those who are high risk and triaging them to be faster.

Heather36:27

I know this all started in your role as an anesthesiologist in the operating room. So, to identify a gap in care like you were seeing at the time and then to see the tool that you've created based on the research that you've done out of that curiosity, how does it feel to receive this recognition and to see the STOP-Bang Questionnaire, as a tool, being used around the world? How does that feel for you?

Dr Frances Chung 36:49

So, it is an honour and it is a privilege. I've been very lucky for a lot of this research being impactful, but I also receive a lot of support from the Department of Anesthesiology at UHN and Mount Sinai Hospital, and also from the UHN Foundation and Resnick Foundation.

Heather37:12

Dr Chung, what kind of feedback do you receive from patients after they're treated for sleep apnea? So, what do you hear from them?

Dr Frances Chung 37:18

Actually, it's interesting. I am not a [unclear 00:37:20] physician. I'm an anesthesiologist, so I don't really treat these patients. However, I have done a lot of studies on patients, surgical patients, that are coming for surgery and they may have sleep apnea, and I would actually, for research, I would give them CPAP, and it's interesting. There is one patient who actually received our CPAP for research purposes and he does not want to return his CPAP machine to us. He says his sexual function has improved so much. [Heather laughs] So, it is very interesting.

But actually, studies have shown that sleep apnea does have an adverse impact on intimate and sexual relationships, and that is related to subjective sleepiness, and they would improve with CPAP treatment, because over 60% of the patients with sleep apnea, they do report they have reduced sexual desire. 46% may have difficulty with sexual arousal, and 29% difficulty with orgasm, and so I do think having sleep apnea diagnosed and having it treated is really good for a long-term health outcome.

Heather 38:35

[gentle, upbeat electronic music] Definitely. I think, of all the health benefits that we've discussed today, related to diagnosing sleep apnea, that's the one that probably people are going to remember. [both laugh] One last question for you before we go, you mentioned, as the S in STOP being snoring, and I think that's probably the symptom that people most often correlate to sleep apnea or the potential of sleep apnea, but not all snoring means that you have sleep apnea, right?

Dr Frances Chung 39:01

Yes. A lot of people do snore and the snoring has to be loud snoring, so it has to reach 50 decibels because it's obstructions, right? So, it has to be loud, and often enough, if you close the door, you can

hear it outside, and I have actually an anesthesiologist, his son probably has sleep apnea, and she says he can hear his young son snoring in the main floor, when his son was sleeping on the second floor.

Heather 39:34  
Wow. Okay. [laughs]

Dr Frances Chung 39:35  
So, this boy, you know, the teenager does have sleep apnea. So, loud snoring, yeah.

Heather 39:42  
Well, thank you very much for coming on the podcast today and thank you for all of this insight. We really appreciate it. Thanks so much.

Dr Frances Chung 39:48  
Thank you. [music continues then fades out]

Heather 39:50  
[Your Complex Brain theme music] Thanks so much to Dr Francis Chung and Dr Douglas Bradley for joining me on the podcast today. Thanks also to Carmen Chu for sharing her story. If you'd like to hear Carmen's full story about her sleep apnea journey, head to our website, [uhn.ca/krembil](http://uhn.ca/krembil), and click on the show notes for today's episode.

[music continues] This episode of Your Complex Brain was produced by Jessica Schmidt. Dr. Amy Ma is our executive producer. Thanks also to Kim Perry, Ali Wilson, Meagan Anderi, Sara Yuan, Liz Chapman, Emma Krebs, and Lorna Gilfedder for their production assistance.

[music continues] If you enjoyed this episode of Your Complex Brain, please tell your family and friends, and don't forget to leave a rating and review on your favourite podcast listening app. Thanks for listening. We'll be back in two weeks with a series of bonus interviews from patients and staff members who were featured this season. You definitely won't want to miss it. Have a great day. [music continues then ends]