Getting Curious with Jonathan Van Ness & Gina Poe

JVN // Welcome to Getting Curious. I'm Jonathan Van Ness. Every week I sit down for a gorgeous conversation with a brilliant expert to learn all about something that makes me curious. And I interrupt the beginning of this episode with a very, just, this is just so major. I have to tell you at the very beginning: our guest has the most stunning fucking hair ever. I just, it is—literally, these waves are so gorgeous, and I typically would wait until the body of the episode to compliment you on this hair. But dang, Gina, this hair is so beautiful. The color, the texture.

GINA POE // Thank you.

JVN // I bet the extra sleep that you're studying is giving it to us and—because the hair is giving us health, honey. So spoiler alert, we're learning about sleep today. (ASMR VOICE) It's getting late. The lights are out. The vibes are right this week, I'm getting curious. We're going under the covers and into the science of sleep. Gina Poe is a professor at UCLA's Brain Research Institute. Her lab researches how sleep can serve learning and memory consolidation. Wow, major. Okay, so picture it. Well, actually don't picture it because I've taken a bath. I just turned on Gardeners' World. That's, like, my sleepy time show. I love it so much. Even though it is so interesting, sometimes it kind of keeps me up—because do you know this show, with Monty Don?

GINA POE // I don't, but I can imagine.

JVN // It's really good. It's about gardens. But, you know, I'm ready for bed. My skin care is on. I've got my seven layers of my nighttime skincare on, my hair is in my silk crunchy. But what's happening between that time, from when I get tired and I fall asleep to when I wake up. What's that about? That's, like, a third of our lives.

GINA POE // Yeah, it really is. And that question, that burning question got me into sleep research 35 years ago. I couldn't believe that we didn't know what we were doing for a third of our lives. And I talked to the experts in the world and they didn't know either. They had lots of great hypotheses, fun hypotheses about what might be going on. But we really didn't have any good, hard evidence of any one function of sleep. And now I know that's because there isn't just one function of sleep. There's so much going on in our entire bodies during sleep. Things that can't happen while we're awake, things that are essential for life itself and beauty and cognition and all of that. So now we know so much more than we knew 35 years ago and it's really astounding how much is happening.

JVN // So, you actually, I mean, you literally intrinsically answer my question. So, like, we do understand sleep a lot better now than, like, when you first started?

GINA POE // Yes, yes. We still don't know if there's any one particular reason why we sleep. It seems to be a lot of essential functions happening that can't happen during wakefulness. But some people think that there must be one essential function for it to occur in every single animal because it does occur in every single animal that exists. So—

JVN // It literally does in every animal?

GINA POE // Every single animal. Yeah. Yeah.

JVN // Interesting. Ok. So I feel like when I was little, I definitely remember hearing about, like, REM cycles. It's, like, rapid eye movement or whatever, right? But, like, what are the stages of sleep? Is it giving, like, 1st, 2nd, 3rd, is there, like, 10? What's the deal?

GINA POE // Yeah, there are essentially two major cycles. One is called REM sleep, which is Rapid Eye Movement sleep because as you said, our eyes are rapidly moving and we're actually dreaming. It's a very active stage. So some people call it active sleep. It's also called paradoxical sleep. Because if we look at our brain activity, it looks like we're awake, but our muscles are actively inhibited. So we don't act out those dreams. And that's an exciting, fun stage. If you wake up someone out of REM sleep, they will always report a dream.

JVN // Oh, really?

GINA POE // Always. So even people who say, "I don't dream, I don't remember any dreams." If you wake them up out of REM sleep, they will report a dream.

JVN // Oh my God.

GINA POE // And usually it'll be vivid and interesting and, you know, random. So that's REM sleep. That's a fun stage.

JVN // Okay, what's the other one?

GINA POE // The other one's not inventively called non-REM sleep! Or some people call it quiet sleep. And that has actually three major stages to it. Stage one, which is kind of when we're dozing, just falling asleep. Stage two, which is really interesting, features in our brain sleep spindles, which are these little blips of activity that synchronize our memory structures with our cortex. That's where we're consolidating and putting away all those memories. And then stage three, which is our deep slow wave sleep. When, if you wake up somebody out of slow wave sleep and you ask them what they were thinking and they will say, "Nothing, you know, leave me alone, let me get back to sleep and they'll turn over and snooze again. That's our deep, deep slow wave sleep when we're really unconscious.

JVN // Oh, my husband's in that all the time.

GINA POE // Yes?

JVN // He, no—that makes sense, no, Mark does that hard core, like, yeah. And then he just, like, goes right back out.

GINA POE // Yeah, that's good. Actually, that's a good sign.

JVN // Oh, good! Okay. So babe's having some healthy sleep. Okay, so that's the second, right?

GINA POE // That's the third one. So the first is dozing. The second one is the spindle stage, stage two. Stage three is deep, slow waves, and then REM is the fourth stage, which is the dream state.

JVN // So, like, most people just go from REM cycle just to awake.

GINA POE // Yeah. I mean, not every REM cycle. Most of the time, it's like the fifth rem cycle that we definitely wake up and—-

JVN // Oh, shit. Really?

GINA POE // Yeah. Yeah. Yeah.

JVN // We have, like, multiple ones a night?

GINA POE // Yeah. We go again and again through the cycles. Stage one, we don't have as much of, but it's usually the first thing we fall to sleep into and it only lasts a few minutes.

JVN // Oh my God. And then you go through the, the spindles and then you go through that over and over again until you wake up?

GINA POE // Yes. Yes.

JVN // Dang! That's interesting.

GINA POE // About five times a night if you get a good night's sleep.

JVN // Oh my God. I feel like I got a good night's sleep last night. I'm, I'm really battling, you guys, because I had a fucking nasty dream last night, like, this random nasty fucking dream. But it's really taking up space in my brain because one of my old clients had these, like, cavities in her feet and they were just, like, open and I for some reason was on the floor. And now since I've woken up, it's all I can think about. But yeah, because I also read in your research because you do study a little bit about dreams. What does that mean? Am I a hot mess? Am I going to be okay? Do I have deep, deep, deep anxiety? Like, why did she have grape-sized, she had, like, a grape-sized hole in her, like, arch and, like, her big toe, and in her heel!

GINA POE // Wow. Are you worried about her or no?

JVN // No, but I do follow her on Instagram. She's one of my old clients. I really like her. She has a cute baby. I think she's fine. I mean, on her Instagram, she seems totally fine. What's wrong with me though?

GINA POE // No, no, no, no. It's nothing wrong with you. That's actually really interesting. A colleague of mine, Antonio Zadra and Robert Stickgold wrote a book called When Brains Dream. And I think they have a really good hypothesis about the meaning of dreams, which is, it is not random. It is actually a time when we bring up things that we haven't resolved in wakefulness. So things that have come up and we haven't resolved and our brain is putting it together in odd ways to try and come up with a creative solution. So it might be that those open sores had something to do with anxiety about health—-

JVN // Okay, I actually have a family member who has this gigantic open sore on their leg. It's, like, you've never seen a wound! And then my brain, I'm kind of traumatized from the picture. Like, it really kind of fucked me up. Like, I can't, it's like, it's, do you think that's what it is because that just was, like, two months ago!

GINA POE // Yes, yes, yes. Your brain is bringing it back up and saying, "Okay, what about this? How are we going to solve this trauma that you have experienced?" And, and so transferring it to another person is really healthy and transferring it from the leg to the foot, you know, or some other place is also really healthy because the more we sort of randomly toss up these things, the more we can make new associations and resolve the trauma and emotions of that memory.

JVN // And I also really like the client, like, I really like her, she's, like, fun. So maybe I was just, like, "See, like you could still be fine, like, you could still be fine with, like, holes in your legs, like, it's not so bad!" or something. Like, I don't know!

GINA POE // I think that's what you were doing. You were associating with someone, you like, some—something pleasant.

JVN // And then I think I woke up, like, not that long after that because actually my dog has a cough right now. One of my dogs has a cough. And her cough sounds like a human and it literally woke me up. I was, like, "Oh," and then I was, like, "Ah," and I remembered it. Ah, it's so true!

GINA POE // You remembered it because your dog coughed. It might not have ever been remembered otherwise.

JVN // Wow!

GINA POE // Your brain here is doing its job, trying to rearrange things, put things away. The only reason you remember what happened is because your dog woke you up. Which is actually interesting because in the United States, pets are the number one disturbers of our sleep.

JVN // Oh, that's fucking, that's for goddamn sure. I got five cats, three dogs and those fuckers—

GINA POE // Oh my god!

JVN // No. And my husband, I mean, I swear to God when we got our third dog who has separation anxiety, he literally kept us up, like, it was, like, having a baby for six weeks. Which is how I know it wasn't like a baby because it only took six weeks, you know, and then he got it together. Oh wow. Okay. I'm going back to my questions now. I'm having so much fun, Gina, I can't, I hope we didn't lose a bunch of listeners just for me telling that story because, like, it was, it was a lot you guys.

GINA POE // But if you had a dream that was just exactly what you saw and what you experienced that actually would not be as healing.

JVN // Oh!

GINA POE // So it's actually the randomness that, I think, helps you to form new insights into these questions. So during wakefulness, our brains are mostly logical, one step after another. And serial and pedantic, relatively pedantic. But when we're asleep there's all kinds of random stuff that is going on that we don't question as much because, because our judgment and decision-making and logic parts of our brain are off.

JVN // Gina, come through with the $30 word, though, of pedantic. What does that mean? Again? It's like—

GINA POE // Think of peddling, just one foot after another. just, you know, it's not—

JVN // Like, in the autopilot. Just, yes, wow, that's a social media moment. You guys, mark that down, "pedantic." Vocabulary words. It needs to be a series on our 'gram. That's, I hope people are ready for me to start using it. Thank you, Gina, for that. Okay, why is sleep so important? Like, I know that when I don't sleep and interestingly trigger warning not to go from what I was just talking about to another trigger thing. But as someone who struggled with drug use a lot in my twenties, I always remember, like, how bad it would feel, like, after a relapse, like, the next day, you know? And I always attributed that to the drug. But it's actually, I now know from transatlantic flights and jet lag that actually I feel similarly crazy having done no drugs and just having, like, a weird night's sleep. I'm like, "What is this weird buzzing that I feel? And, like, how come nothing makes sense?" And, like, I read a sign and it takes me, like, a really long time to understand it and, like, just takes, like, a day or two. And I think, and I'm like, "Oh, it's lack of sleep!"

GINA POE // Yeah. Yeah, it is.

JVN // But so what happens? Like, what, like, why is it so important? And, like, what's that weird feeling I have when I don't get the right sleep?

GINA POE // The weird feeling is your brain struggling to, to function. It takes much more energy and many more parts of the brain working in concert to do the same tasks and the

same thoughts, have the same logic that happens easily with small amounts of your brain when you're well slept. And there's a great series of studies by Sean Drummond from UCSD when he was back at UCSD that actually did that. Did a night's sleep deprivation and had people doing a subtraction—one back to back, three back task, where you're supposed to remember or subtract, you know, one number from the number you heard three times ago. And normally people can do that pretty well. I mean, they struggle, but they can do it. But when you're sleep deprived, even though your performance might not be worse, there's so much more of your brain that's dedicated to it in order to keep it up. So you'll be a little slower and much more of your brain has to get involved in order to do that.

JVN // Yes!

GINA POE // Yeah, so that's what you're feeling you're feeling that struggle, right?

JVN // How does it serve, like, our physical health? Like, what, like, chemicals is it making or, like, why is it so important to our health?

GINA POE // Well, one of the reasons why it takes so much more of your brain to do cognition when you're sleep deprived is because it hasn't had that cycle to clean it. So when you're awake, you're creating a mess inside of your brain, you're pulling out books from the library. You are, you know, having a big party, people are bringing things in every time you learn something new. And that creates a big jumbled mess, right? And so you need sleep to clean it all up and to put it away. And if you don't sleep, the next day, when you try and have another party, it's just already a mess and people don't know where to go. You know, your, your thoughts are, are not as linear and sufficient.

JVN // That makes so much sense. And it also must mean, like, 8:45, 9 o'clock, I literally, like, cannot, like, I get so tired I, like, cannot stay awake.

GINA POE // That's great!

JVN // Like, I just, I really do, like, unless I'm, like, on tour, like, my comedy tour because, like, I'll drink coffee past when I'm supposed to. And, like, that's kind of—but, like, typically, like, in my day in day out, like, I am, like, a really early sleeper and then I wake up really early.

GINA POE // Yeah, that's wonderful, good for you!

JVN // Like, my little brain, like, my little circadian rhythm. Is that a real thing or are these hoes out here saying "circadian rhythm" when we don't even know what the fuck it means?

GINA POE // No, we do know exactly what it means. That's one of the most advanced areas of sleep research is circadian research. So, yeah, it's great. If you have a strong circadian rhythm, that means you have a very young brain. It's, yeah, you're, you're cognitively young, you are great. You're wonderful.

JVN // So, like, I have a thing but tell me if it makes you roll your eyes when I tell you.

GINA POE // Okay, I'm ready!

JVN // I think that my circadian rhythm or whatever works best in Central Time because, like, I'm from central time and then like, I, like, have been living back in Central time for the last three years and like, I had been on west coast for nine and then I've been on East Coast for like three and I really do feel the best in this time zone, I realized, but I didn't know until I moved back to it.

GINA POE // That's interesting. That's really interesting because there are really good studies that show that people can adjust to different time zones, of course. It does look

from the data that I've looked at less perfect, like, a less perfect adjustment. So there are lots of clocks. Every cell in your body has a clock and it's all orchestrated by one central clock called the suprachiasmatic nucleus.

JVN // Damn!

GINA POE // SCN for short. So there's one kind of orchestrating clock that causes us to release hormones at particular times, that orchestrates the clocks in all of our rest of our body. So when we switch time zones, say three hours east or west, you are initially out of sync. So maybe if you expose yourself to light at the right time for the place that you're going to, that can reset your suprachiasmatic nucleus, your central clock. But then it takes awhile, a couple of days, before all the other clocks are set to that time. So for example, your gut clock when you're hungry—

JVN // Yes, because I'm so predictable. But then when I travel, honey, I'm, like, "Ah!"

GINA POE // Yeah.

JVN // "I hate it! This is not how it normally works!"

GINA POE // Right? Yes, exactly. So it takes a few days before all of the rest of it to fall in line with the central clock. And the further you go, the longer it takes. So we can adjust an hour or two in one day. But if you're going nine hours, it'll take, you know, a week or something like that.

JVN // Oh, how interesting. So about 1 to 2 hours a day. So, if you're going to Australia, which is, like, you know, 10 or 12 or whatever, so then that would literally take, like, that could take damn near a week.

GINA POE // Yes. And even then, the peaks of the hormone release and all of that don't seem to be as strong as they were in your home place. I've never seen a study that goes long enough to see when it really, fully gets in line.

JVN // Oh, my God, I'm obsessed with sleep. Now, I was really interested in this part of your research, which is, like, memory formation and consolidation. Obviously, I knew what consolidation meant, but I didn't really think about it in terms of, like, sleep. But it's such a big aspect of, like, sleep research, which I just thought was, like, "Oh fun." How do our brain store and then toss info while we sleep?

GINA POE // Okay. So our neurochemicals, the chemicals in our brain are completely different when we're asleep than when we're awake. And in those four stages of sleep, they're all unique. One can't substitute for another. So we talked about cleaning, the cleaning function of deep slow wave sleep. That happens about 50 to 90 minutes after we first fall asleep and it happens in the first couple of cycles. So in the first three or four hours of sleep, you have this deep slow wave sleep. After which time you don't have it anymore, you have the other stages but not that deep slow wave sleep. So you really need the first three or four hours of sleep in order to get that deep cleaning function to happen. And if you skip it, it won't happen.

JVN // Ah, that's interesting. Okay, so, like, you at least need, like, four and you still might be, like, feeling tired, like, more tired than you normally would. But, like, you're going to feel, like, fucked up if you don't get your four.

GINA POE // Yeah. And it has to be at that time when your circadian rhythm thinks it's time to go to bed. So you do need to listen to your body when your body says, "Go to sleep," go to sleep. Because that's when you're gonna get the most deep cleaning sleep. But that's just one of the functions. The other thing you do is basically put away all of those things

that you learned during the day. And that happens throughout every cycle of sleep in that stage two, which you get in every cycle, whether you get stage three or not. And stage two happens when you're falling asleep. And also just before you go into stage four, which is REM sleep, it's not called stage four, it's called REM sleep. But that spindle state of stage two is when your memory structures, your associative memory structures, which is where you're putting faces and names together and all of these kind of things, that's when it's connected best with the rest of the cortex where you're putting it away in long term storage. And so this associative memory structure is only good for short-term memory, you know a day or two after which time it has to be put away or it's lost.

JVN // That's stage two?

GINA POE // That stage two!

JVN // I think my stage two is broken sometimes.

GINA POE // Maybe you're not getting as much, maybe it's not as efficient.

JVN // Yeah. There's some people who, like, accidentally, like, there was this one guy whose name was this one name. I don't want to say it but, like, in my mind he was this other name and I literally could never fix it. Yeah. So I think, and that happens to me, like, sometimes—it's, my stage two, I wonder if it's the weed that I don't smoke.

GINA POE // Probably!

JVN // So, back to the Mythbusters Sleep edition. Do we have any studies if one were to smoke weed…

GINA POE // There aren't good studies of sleep and that because it, it was such a highly classified, ridiculously, highly classified that researchers couldn't even get their hands on it.

JVN // Now, what about alcohol? What about that wives' tale about alcohol? Okay. So wait, I have another hypothesis. Are you ready? Another off cycle hypothesis? I feel like I've had it told to me that it's like if you eat a bunch of food right before a bed that's high in sugar or it's, like, why alcohol can be hard on your sleep. It's like it makes your blood sugar spike or something and like that can wake you up. And I feel like I've heard that anecdotally obviously never from a doctor, but it's just like something I feel like people say, but I do feel like if I, like, you know, really whale on a bag of cookies or if I really went out hard, I do feel like, you know, you maybe get home at, like, 11:30 or midnight or whatever because you went out and then, like, I feel like it kind of does make me wake up at, like, two or three or something where I normally wouldn't. But maybe that's because I have, like, a stomach ache or something?

GINA POE // Well, alcohol will wake you up—

JVN // Ah!

GINA POE // —About two or three in the morning. And that's because the metabolite of alcohol kind of does the opposite thing that alcohol does in terms of alcohol—making you sleepy—the metabolite of alcohol wakes you up. So it will disturb your sleep. It will disturb your sleep both ways because even when you fall asleep on alcohol, it won't be good quality sleep with everything timed the way it needs to be.

JVN // Because your cells are literally drunk!

GINA POE // Yes. Yes. So the sleep doesn't do what it needs to do and then it wakes you up at a time after it's metabolized and when you could get good sleep, it wakes you up. So that's, it's bad both ways.

JVN // Not to advocate for alcohol consumption. But, if you, do you think, like, a brunch cocktail or two is better because then, like, you—because then I still get tired anyway, like I actually did that on Sunday and then I literally, it, like, knocked me out from, like, 3 to 6. Like, it was also just, like, hot out. So, like, when I got home I was, like, I just passed out, but then I got a great night of sleep till after that, like, after I woke up.

GINA POE // That's great! Yeah. Yeah. If you're going to have alcohol, you know, do it, like, the Norwegians do—take a shot in the morning.

JVN // Ah, I love a good Norwegian cultural moment. So, if you've had a bad day, it's, like, is it really possible to sleep it off? And I feel like a little bit of what I was thinking is that, like, because you've been making a mess, you're really pulling out the books, you're really trying to problem solve and maybe you didn't, you know, eat the same because it was just, like, stressful and stuff. So, maybe, like, even more systems got kind of off?

GINA POE // If you're having a bad day, can you sleep it off? Absolutely. Absolutely. You can. But, if you're trying to fall asleep while you're still stressed, I would suggest that instead you do what you did: take a nice bath, watch your gardening show, relax first. And then your night's sleep will be a restful, restorative, healthy sleep that does what you said, which is put away those old emotions and divorce the memories of the things you struggled with from the emotions of it. So the next day you recall what happened yesterday, it won't bring up all the same emotions. You will remember it, but it won't be in a, a visceral memory. If you don't do that, in fact, fall asleep while you're still angry and upset, you can actually make your sleep maladaptive. So your sleep can turn against you. And instead of helping divorce those emotional memories, the visceral part from the cognitive part, it can cement them together. So you will always have that memory together. And when you recall it, you will have all the visceral recall, too, which is the fundamental building block for Post Traumatic Stress Disorder.

JVN // That's really interesting. So, it's really about kind of being mindful. You want to take that time to divorce the emotions of the day versus the events of the day. So you can, like, remember what happened. But you're just, like, trying to, like, detach from the, like, anger or resentment or letdown or even the excitement or, like, whatever, just, like, all of it. You're just trying to, like, detach.

GINA POE // Yeah, mindfulness. So what one of my colleagues does is he prays, because that brings him back to his overall world universal view that it's going to be okay in the end. He gives his cares to God and releases it, essentially. Some other people meditate. For other people, it's a super cold bath followed by a nice warm shower, you know, and for some, it might be knitting or reading a good book or laughing with a friend or listening to wonderful music that you love. Whatever it is that helps you sort of lay to rest. It might actually be just thinking about what happened and writing it down and making a list for what to do about it the next day. So you can calm and relax enough to go to sleep and have restful sleep.

JVN // Ah, ok. I'm loving that we touched on that. That's so good. Well, what about the hot days? Does hot days, like, affect our sleep? Because it's hotter than fucking hell right now.

GINA POE // Yeah, yeah, we can't go into REM sleep because that's the time we stop thermoregulating if it's too hot in the room or too cold in the room. So you do need your bedroom temperature to be about right with the air and the blankets and all of that.

JVN // Sometimes, like, right when I get in bed and then, like, when I first get out of bed, like, so cold. So cold, what the fuck is that about?

GINA POE // Oh, yeah. No, that's also a fairly under explored area of sleep research, but it's really, really interesting. So, so when you fall asleep, your core body temperature does reduce and it does that—and it needs to do that—in order to get good sleep. But in order to do that, you need to have your peripheral vessels dilate and lose heat in order to cause that, So if it's really cold outside and your feet are freezing, you can't do that. You're vasoconstricting all the periphery and you can't fall asleep if you're too cold. Right?

JVN // So you mentioned earlier that, like, even people who say that they never dream, but when they do sleep studies, if you wake them up in the middle of a REM cycle, they will remember their dream. So, like, does everyone dream, even if they don't remember? Or like some people's just, like, more mild and that's why they don't remember because they're just, like, boring dreams? Or, like, everyone does dream?

GINA POE // Everyone does dream, and some people only remember their boring dreams because they wake up out of the stage of sleep when the dreams aren't as vivid.

JVN // Is there, like, a disease that's, like, no dreaming-itis? Like, someone's brain doesn't dream and they get all fucked up from not dreaming?

GINA POE // The dream stage of sleep, it's required. If you don't have that one, you will die and you'll die just as fast as if you don't have any sleep at all. The only disease that is sleep related that will kill you is called fatal familial insomnia. And—

JVN // Oh my God, I think I've heard of that. What the fuck is? Is that that thing in Italy or something?

GINA POE // Yeah, there's a family in Italy that what's thought to occur is an area of the thalamus, which is our gateway of consciousness. A portion of cells start to die in the thalamus and the hypothalamus, the part that puts you to sleep. So if you lesion that area in any kind of animal or somebody has a stroke that lesions that area, they won't be able to sleep and they will die.

JVN // Really? How scary another thing to add to the, like, existential threat list. So, but in that family, they just have, like, some naturally occurring thing where they just get, like, a, like some sort of, like, scrape or cut or lesion or whatever in that part of their brain and it fucking—

GINA POE // Yeah, and it happens after reproductive age. So they can still reproduce and then they get it and they die. So—

JVN // Does everyone in their family have it?

GINA POE // I think it is autosomal dominant?

JVN // What dominant now?

GINA POE // Autosomal dominant, meaning even if you just have one copy of the gene.

JVN // So but that's the only sleep disorder that kills people?

GINA POE // Well, that's the only one that will *directly* kill people. There's also sleeping sickness, which is caused by a worm, I believe?

JVN // It just fucks up your sleep and it's, like, a parasite in your brain?

GINA POE // It's a parasite that just makes you sleep all the time, and eventually you'll die.

JVN // Oh fuck!

GINA POE // Yeah. Not good.

JVN // What about narcolepsy? Is it real?

GINA POE // Narcolepsy is real. It won't kill you, thankfully, unless you fall off of—

JVN // A cliff or something. What about, what about the lady in Fifty First Dates or whatever? Do you remember that lady that, like, just, like, is that how narcolepsy really is? Or is that, like, a movie adaptation—like, a movie version?

GINA POE // There's nothing real about that. Although it's a very interesting movie and it is about memory and sleep. So I love it!

JVN // Gina, I'm sorry that I, like, accidentally devolved into, like, an interrogation of, like every sleep wives' tale I've ever heard in my life. But, so how does narcolepsy work, then? Like, in someone who has it. What, what is that?

GINA POE // We know a lot about that. That's another one of those sleep things that they didn't know anything about when I started. And it's not me who discovered anything about it, but parallel to me, Jerry Siegel at UCLA and Emmanuel Mignot at Stanford came up with a solution. And what it is is it's an autoimmune disorder which kills a particular kind of cell in your brain called the hypocretin cells or orexigenic cells. And it's only those kinds of cells that die and those cells are involved in our drive for anything. You know, it's drive for sex, for drugs, for food, for excitement. And they are in your hypothalamus. So, beneath your cortex. And there are 500 times more of those cells if you've been addicted ever in your life to heroin.

JVN // Oh, great. I've never done that one. It's like the only drug I haven't done. I'm so excited. What about other drugs?

GINA POE // So we don't know, we don't know. But it's quite possible that it, any kind of addiction. Anything that drives you to do things against your own self-interest—

JVN // So people who just have, like, really addictive personalities, like, our, our hypocretin and our orexin are just out of fucking—

GINA POE // Probably. Although we don't, you know, we don't know enough yet—

JVN // Shit. Fuck!

GINA POE // But good, good news is there are beautiful drugs for that.

JVN // Oh, yeah? Like, what?

GINA POE // So there are, orexin, there are two different kinds of receptors for it, and you can block those receptors.

JVN // Is it gonna make me un-fun or will it make me not self-destructive? Both?

GINA POE // You know, that's a really good question. No, we don't know yet, we don't know yet.

JVN // Are they out here prescribing those yet. Should I get, like, a sampie?

GINA POE // You could, you could get a sample, see what, see what it does. The other side of that, though, is narcolepsy, right? So people thought that these orexin one and two receptor inhibitors might cause narcolepsy but it doesn't. So thankfully that's good.

JVN // So how does narcolepsy actually manifest? Like, are you just more, like, sitting at breakfast and you fall asleep or—

GINA POE // No, no. So, so all of those things that drive, like, sex and humor, things that really get us excited, go through this orexigenic or hypocritic system and then awake and alert and arouse you and help you stay engaged and excited about it, right? And that goes to another brain stem structure called the blue spot or locus coeruleus in Latin. It's called locus coeruleus, like cerulean blue. So it's called the blue spot and that is an alerting and arousing area of our brain—helps us to pay attention, helps us learn all this stuff. It also is connected just beneath that to a group of cells which are involved in maintaining our muscle tone or inhibiting our muscle tone. So for, for example, when we're in REM sleep, this area called the locus coeruleus, the blue spot is off and that sets into effect a cascade that also inhibits our muscles. So we don't actively act out our dreams. And so this is all connected, I'm gonna get back to how. So, so people who have narcolepsy don't have those orexigenic or hypocritic cells that project to this alerting and arousing area. And so instead of alerting and rousing, what it does is it sort of short circuits and goes to the inhibition. So they fall down laughing and fall asleep into REM sleep. So instead of waking up, they go into the opposite REM sleep and instead of, you know, being able to maintain muscle tone, you get weak and you fall down.

JVN // So narcolepsy people fall?

GINA POE // Yes, they fall a lot, yeah.

JVN // Oh, and they fall asleep a lot or is that just a movie thing?

GINA POE // No, they fall asleep a lot, too. They're sleepier in general and will fall asleep at a, you know, a dime because they don't have this alerting arousing system.

JVN // And what's the fall down laughing part?

GINA POE // Yeah. So that's kind of a short circuit of normally it would be, you know, humor, orexin, orexin, locus coeruleus, locus coeruleus keeping you having good muscle tone. If you don't have those two in between sections, the humor isn't protected anymore and you fall down. So you get weak in the knees, which is actually fairly normal.

JVN // So if someone who has narcolepsy, just, if someone makes them laugh really hard, they might just, like, literally fall?

GINA POE // Literally fall over and be, you know, unconscious for—they sometimes just maintain consciousness but go into REM sleep for a little while.

JVN // How interesting! So, like, in a movie or something, like, if it's really exciting or really funny, it might just, like, knock you the fuck out?

GINA POE // Well, I mean, any kind of strong emotion, actually. So fear, you know, a favorite food being presented with a favorite food, excitement.

JVN // Not the fear! Like, your house gets broken into and you fucking fall asleep? Like, no!

GINA POE // No, not good. The, the treatment for it is amphetamines. And interestingly because there are no orexogenic, hypocretic neurons, they don't get addicted to it and they won't need escalating doses for it. So, isn't that interesting? No addiction in people with narcolepsy.

JVN // Goddamn! But then you also don't have muscle tone?

GINA POE // Only—normally muscle tone, fine. But when you're really excited, yeah, you'll lose it.

JVN // Interest! So, sleep paralysis demon. Is it real? Is it—

GINA POE // Yes, it's real.

JVN // It’s real!

GINA POE // So, that's another dissociated state.

JVN // I just have never had that happen to me.

GINA POE // That's a narcolepsy-like state. People with narcolepsy, cataplexy have sleep paralysis all the time. I've had it a few times, you know, if it's normal to have it a few times, if you have it all the time, it might be narcolepsy or cataplexy. But if it happens once in a while, especially when you're sleep deprived, then it's probably just that your brain has awakened. But the brain stem area that's still paralyzing your muscles is still paralyzing your muscles. And it can be so frightening because you're, like, “I can't move. I can't even blink. I can't even, can't do anything. I can't tell anybody I'm awake.” What to do about it is not to panic. Don't panic. Just try and relax and fall back to sleep and the next time you wake up, it'll be normal.

JVN // I love a solution, that was, like, so solution-oriented. Okay, memory consolidation. The reason why that kind of blew my mind just then is, is it made me think about racism, transphobia, xenophobia, whatever. Like, if someone's really ardently learned something and their brain reacts a certain kind of way to new information. It's going to take maybe longer for people to fucking unlearn stuff!

GINA POE // Oh, you have touched on it. Exactly, Jonathan, this is exactly right. And it takes a while. It takes a while to both form new connections and to undo the old connections. And in fact, unfortunately, things that you've learned in the first 8, 10 years of your life may never be completely undone. But what you can do is form new connections that you prioritize and you can inhibit the old ones. It takes extra work though. It actually takes a second step and more work to inhibit the knee jerk reaction that we learned in the first 10 years of our lives. And so it takes our full cognition to be able to inhibit the old learned patterns in accordance with our own values, for example, our own newly formed values. So it takes time to unlearn and it takes a well slept brain to adhere to the new things that you've learned.

JVN // And also, like, sidebar, it's, like, we're probably underslept, like, as a country—

GINA POE // We are.

JVN // Like, because people are working harder, longer. And it's like they are already fucking nightmares. But then you get them tired and cranky and fuck me. I bet all these Karen we're seeing on Instagram have the sleep apnea, which brings me to another thing, sleep apnea!

GINA POE // You asked what sleep disorders would kill you? And sleep apnea will.

JVN // It will?

GINA POE // It will take time but it will kill you.

JVN // Wow.

GINA POE // Your poor little heart is a muscle that needs to beat all the time. Right? It never goes to sleep, ever, ever, ever. And so it needs oxygen all night long, just like it needs oxygen all day long. And if you're stopping breathing and your oxygen is desaturating from, you know, 98% when you're awake to 60% when you're in sleep apnea, your heart is working in an anoxic. It's damage to the heart. It really is, literally damaging your muscle of your heart, so…

JVN // So sleep apnea, the definition of sleep apnea is…

GINA POE // Stopping breathing while you're asleep. And it could be caused by many things. It could be central sleep apnea, which happens when—well, we'll skip central sleep apnea, for a moment.

JVN // No, I wanna know that sleeping on your back?

GINA POE // No, that is obstructive sleep apnea. So when you're sleeping on your back and your muscles, for your airway aren't as strong as they need to be or you have a whole lot of tissue on your airway that's pushing back on it and you're sleeping on your back, then your airway will close. And even though your diaphragm is trying to inflate your lungs by pulling down with the closed airway, there's nothing that can go in it.

JVN // So it's not even a weight-related thing. Like you could just get it no matter—

GINA POE // It's age, it's weight, it's the size of your tongue. It's the size of your chin, the prominence of your chin.

JVN // Damn, okay. What are the other types of sleep apnea?

GINA POE // So obstructive and central are the two major ones and people with sleep apnoea don't even realize they have it, you sort of need someone to be in the room with you telling you, "No, you stop breathing when you're asleep," and they can hear it. And then you, they go, you know, [APNEA NOISES] to wake up, they have to wake up to restore their muscle tone in order to start breathing again. And it's just so unhealthy for so many reasons. First reason is because to even be diagnosed with sleep apnea, you have to do that five times in an hour, which means five times every hour you're waking up and that is so destructive to your sleep continuity and all the things your sleep needs to do. And there are people who wake up 500 times a night, easily.

JVN // And there's no app, there's no app that can, like, record you for sleep apnea or something?

GINA POE // There actually is—a couple of devices and probably would become an app if it isn't already that can listen to your sleep. Unfortunately, if you sleep with your dogs and cats and your bed partner, it doesn't know you from anyone else. So, so it can be fairly inaccurate. But yeah, it would be able to diagnose just by the sound of your breathing.

JVN // Are some symptoms of sleep apnea. Like, is it just like being, like, really fucking tired even though you like slept for eight hours or something? And you're giving, like, transatlantic sleep deprivation vibes all the time?

GINA POE // Yes, there are people who live like that for years, feeling that awful, unrested. And they try and sleep more, and they—if they sleep more, they just get more apnea. You know. So there's, there's no escape from it unless you use either the CPAP device or there are some new things that are being developed right now, like implantable electrodes that stimulate your airway to keep it open.

JVN // Is there, like, a kegels of airway that we can do to prevent sleep apnea?

GINA POE // Play the didgeridoo!

JVN // So just blowing into something real hard?

GINA POE // Trumpet. Didgeridoo or singing. Singing all along—

JVN // Oh, I'm about to sing so fucking hard. Yes. (SINGS) Y'all, we gotta work out these throats. I have one more question about it. Is it, like, sudden onset or is it, like, a long time for it to happen?

GINA POE // As we get older, past age 40 every year, we have about a 1% loss in muscle tone all over our bodies unless we work against it.

JVN // No! Not the 40. I'm so upset. I'm only four years away from the first 1%. Fuck. Haven't I been through enough? Shit.

GINA POE // You can prevent it. You can prevent it!

JVN // How?!

GINA POE // By working out, working out your airway muscles, working out your body sounds like you're gonna be fine. You're gonna be fine.

JVN // It's fine. I'm processing. Look at me, my, my blue spot. Calm down, blue spot.

GINA POE // Oh Jonathan, you're so smart. This is so great.

JVN // No, I'm literally having so much fun. I can't stand it. Okay, so recently I have become obsessed, addicted, whatever you want to call it. Like, is it having impacts on my life, we'll see with gaming. It's, like, the new thing that my brain is really into. I'm hardcore obsessed, especially with this one game Fortnite. It was Grand Theft Auto for a long time. But I notice, you know, if I get done with the flight or whatever, like—like, a month ago, I got, I was on this flight since, like, 6:30, like, we didn't know if we were going to even, like, leave or not. But even though I got home at, like, two in the morning, I was like, "I need it, I need one little Fortnite game." And then my shower, really, I did, I did feel good. It was just not turning my fucking—because I have that everyday alarm on. That fucked me up because I forgot to turn my alarm off and the next day it was a Sunday. And so then I went to bed at three, but then my alarm woke me up at 6:40, for my normal alarm. And then I ended up taking like two or three hour naps that day, which is unheard of. So maybe the Fortnite does fuck up my sleep if I'm already. But that was, like, a weird day.

GINA POE // Well, it was a weird day. Don't hang too much on it. But it might be that Fortnite does for you, what the cold bath does for some other people, which is, it's a strong activator of all of those, you know, fight or flight systems. The locus coeruleus goes into high gear and then did you say you rinsed off afterward?

JVN // Yeah!

GINA POE // Maybe that was the rebound relaxation after that excitement.

JVN // So how will my brain and body react to an abbreviated sleep? I mean, obviously, there's probably, like, the long term health effects, but, like, in the short term, like, how will my brain and my body process that the next day?

GINA POE // Right, so abbreviated is a good way to put it. There's disrupted, which is sirens and all that and sleep apnea, that's disrupted. So it might be just as long, but it's broken up. And that's one thing. But abbreviated, for example, if you go to bed, not till three in the morning, you've lost all of that brain cleaning stages of sleep. You've also gone to sleep at a time when your circadian rhythm is no longer set for that. And, and your whole body's clock is not ready to, to fall asleep for the first time. At that time. You needed to fall asleep when you needed to fall asleep. Even if you get plenty of sleep from three in the morning, if you'd slept till nine, it would have been good for other things though. That sleep in the latter half of the night is good for clearing the emotional aspects and resetting

and, and lots of insight. So there's a lot of that REM sleep and stage two sleep interaction in that part of the night. It's unclear, if you've missed the first part of the night, whether that second part of the night can do all of that as efficiently. For example, if you're trying to do all of that work when there's still a mess in your brain, you can, I can imagine it wouldn't be as efficient.

JVN // And then, so then, like, the last is, like, more, like, emotional, you said. The beginning is more, like, the cleaning things out, putting it back, making new space.

GINA POE // Yeah. Well, the other thing I missed is that in that first part of sleep, you're also restoring energy, but actually it sort of doesn't matter what time you go to sleep, that will happen, even a nap in the middle of the day, you'll start restoring energy and then also building proteins. You do need an alignment in that first part of sleep between your circadian and your sleep, actual sleep systems to build proteins, which is both muscle repair. It's brain growth and growth of new synapses between areas. So that's the other thing. So if you miss the latter half of the night, which is really stage two and REM, back and forth, then you will have had that brain cleaning and that's good. But you will have less of that sort of insight-building, random dream-generating sleep.

JVN // Especially the second half.

GINA POE // Yeah. So for example, teenagers naturally will sleep later. They need just as much sleep as a 10-year-old. But because they go to bed later, if their school start time is too early, they'll curtail themselves of that last half of the night—insight, readiness, creativity, and emotional. And so teenagers who get more sleep by going to bed earlier and resetting their clock, they will feel better right away. They'll feel better, less anxious, more cognitively ready to face the next day, better judgment, better decision making. And if schools start later, like, just even an hour, just 45 minutes more sleep in the morning for teenagers is enough to make them do better in everything.

JVN // Yeah, I like that. It's really interesting for me because, like, I've always been a morning person, like, my alarm almost never wakes me up. Like, I almost always naturally wake up, like, you know, like 6:15 or, like, 6:20 for the 6:40 alarm. Like, that's, like, my natural place. But it's like, if I, you know, have to wake up at four for a flight or something, I just feel like a fucking bus hit me until I get my first coffee. Then I feel totally normal. But, like, I want a coffee, like, right away right away and then I'm like, "Okay!" and then I'm, like, talking my assistant's ear off in the car and she's like, "Bitch, it's five. Why are you talking? Like, how are you in this good of a mood?"

GINA POE // I can tell you what coffee does!

JVN // What does it do?

GINA POE // It makes your brain think that you've had a full night's sleep because it blocks the receptors. Caffeine is an adenosine receptor blocker and adenine builds up in your brain the longer you're awake. And so it's the thing that helps make you sleepy at night. And so if you take caffeine, it makes your brain think that there's no more adenosine. Because the first thing that happens when you do fall asleep is Adenine starts to be converted into its energy. So if you don't get enough of sleep, I guess, you know, there's still too much adenosine and you're blocking it makes you think that you had a full night's sleep. And so, but it doesn't actually restore your energy.

JVN // Well, tell that to my body, honey, because she feels she's really restored when she has her coffee. And when I don't, I don't, honey! I'm definitely addicted to the coffee. Do you not fuck with coffee as a sleep scientist? Like, you just don't fuck with it. It's too much?

GINA POE // You know, all my life I haven't had caffeine. As I get older, I do now enjoy, I, I moved to France for 10 months and there I drank coffee because everybody does and it was kind of fun and delicious. So I started drinking coffee then and now I drink tea, but only in the morning and afternoon I can't, can't drink any. Otherwise it will keep up.

JVN // You—you're giving me glowy ass fucking perfect skin! You're making such a strong case.

GINA POE // Well, thank you. Thank you. Well, I think I'm also a little unusual in the sense that I'm more sensitive to caffeine than other people. So, like you said, you talk your assistance ear off when you're on caffeine. When I'm on too much caffeine, it's not pretty.

JVN // Ok? Wait, so the adenosine. So the coffee is an adenosine…

GINA POE // Receptor.

JVN // Okay, because one thing that is a problem for me on tour is like, if I like, typically I don't drink coffee, like after, like, one or two, like, that's, like, when I'll have like my last call, you know, in the afternoon. But then if I'm on tour, like, I'll drink a coffee at six o'clock at night, like, you know, because I'm going on stage at seven. But then, like, after, like, you know, just with all the adrenaline and all of, like, the just being on stage and like turning my brain on, like, that when I get back to the hotel, it's like, I just literally need, like, three hours to, like, decompress and to like because the coffee just got me so on. So, but what's the adenosine thing with that. So, like I, because I had the coffee so, like, the tiredness chemical didn't really build up?

GINA POE // It actually built up. But you don't have the sensors for it anymore. The sensors are blocked by caffeine. So you don't know it's there and you don't know how sleepy you are.

JVN // So it's there. But the coffee blocked my ability to detect it. And so I got to wait for the coffee to go away before you're, like, "Oh fuck, I'm so tired." But then it's, like, but then it's, like, one or two in the morning and sometimes your flight's at, like, four or five and then you're just like, really fucked up and tired and I really just start, like, living on coffee for those, like, five days or whatever. I didn't mean to make this all about me, you guys, but that is how I got interested about sleep. So, like, what, what am I doing to myself?

GINA POE // I'm glad you're talking because your experience is quite universal and it's great because what you're doing when you're going on tour is you're a shift worker, you're becoming a shift worker and you're trying to shift your schedule by three or four hours for three or four days and then you go back and back and forth. And there are a lot of people who do shift work for a variety of reasons and in a variety of jobs and unfortunately, industries that cause people to do these shift works are not cognizant of the right schedule to keep people as healthy as possible. So, there are two things you can do. One is you can just align your entire life to the, to the delayed shift or advanced shift.

JVN // No, I got to ramrod it through, just for the shift. So, what am I going to do? Because that's not gonna work for me. What's the other thing I'm going to do?

GINA POE // Well, it sounds like you're doing alright. You don't want to do it every other night. For example, you want to do it a block of time and then shift it back.

JVN // Should I try not to drink so much fucking coffee? Like, maybe just do, like, a less caffeinated tea or something in the afternoon?

GINA POE // Yeah, I wish there were an antidote to caffeine actually. And people think alcohol is, but it isn't, it isn't at all.

JVN // Well, I do know some gummy bears that feel kind of antidotal but I don't really know because—and I don't really know about that because…

GINA POE // Well, I, I said earlier that there is not much on sleep and weed, but in fact, there was a really great study that I saw probably 10 or 12 years ago. I saw the poster. I saw the results. It was incredible what marijuana did to sleep and it, what it did is it eliminated that stage two sleep or rather those spindles.

JVN // Which is what I said, mine's broken! Because I can't remember their names!

GINA POE // Yes. It seems to just morph the spindles from, you know, healthy to a weird, weird morphology. But we don't know what that does to memory yet, so…

JVN // But can I tell you, anecdotally, for your people? But you probably already experienced this? I feel like my memory from, like, before I started smoking, I are trapped iron fucking trap like everything up till 17 bitch. I remember all my fucking teachers' names. I remember all my chants from high school cheerleading. But then, and, and then it still is *good*, like, it's not bad but it's like it's definitely that just makes sense to me that it's, like, that stage two. Is there no, there's no little bath time, bath ball. I can do that if I get a little more mindful or something with it?

GINA POE // No, no.

JVN // Shit!

GINA POE // Because it's those sleep spindles that actually the density of them are—sleep spindles are fascinating. They come once every minute or something like that. While you're in that stage two sleep. Or maybe maybe more often than that, but something like that. And the density, the, the numbers you get per minute. And what marijuana does is it takes those sleep spindles which last about a second and the structure of them is really important. It's related to the locus coeruleus, on-off cycle, all of that and with amazing memory consolidation and it, it elongates them so that instead of lasting a second and a half. It's going for five minutes. And that is probably means that their locus coeruleus is not doing what it's supposed to do in terms of timing and all of that. So, yeah, and what, I don't know is how long that lasts. Whether, you know, as you sleep, five in the morning is fine, if you've smoked or taken your gummy at night, whether you know that early morning sleep is recovered and is fine. I don't, we dont—

JVN // Great. So basically I probably just have, like, raging sleep apnea. Like, I probably haven't, like, really slept since I was 17. Is that what my problem is?

GINA POE // There are some devices you can buy, and that will tell you how many sleep spindles you get, whether it's normal sleep, all of that.

JVN // Really? And you think they work, they're accurate?

GINA POE // If they record EEG, if they have electrodes on your skull, then, yeah.

JVN // Yeah. I kind of want to do, like, a sleep study, girl. I need to see what's up with the sleep.

GINA POE // Do it, do it!

JVN // Yeah, I, yeah. Ok. Have you ever done that? Have you ever done a sleep study of yourself?

GINA POE // I did do a sleep study. Yeah, I have super efficient sleep.

JVN // Super efficient sleep. You do, right?

GINA POE // At that time of my life. I was also sleep depriving myself a lot. So eight hours in bed, it was, like, “Hallelujah!” And I slept 95% of that time.

JVN // Oh my God. I love that.

GINA POE // Yeah, it was really nice.

JVN // So we mentioned earlier naps. We love naps. They're a nice tool, bad tool. Do we? Are we all about it?

GINA POE // I love naps. There are people who hate naps. They feel awful when they wake up and there was a study by Sara Mednick. One of my colleagues that showed that people who hate naps don't get the same cognitive benefits from naps that people who love naps do. I don't know why. I have no idea. We have no idea. But for some reason, those who really feel like they shouldn't take naps probably shouldn't take naps and those who love it. Absolutely. A good solid nap with all the stages of sleep is as good as an entire night's sleep for your memory consolidation features. That doesn't mean skip the night's sleep because it's not—a nap is not good enough for all the slow wave sleep, protein building energy restoration stuff. But for memory consolidation, it’s great.

JVN // So, speaking of that, you had mentioned earlier, just to reiterate. So, like, you were saying, like, for protein building for, like, muscles and, like, some other things, you were saying that only happens if the sleep and the circadian rhythm aligns at the right time. So that would be especially hard for like, you know, your Australia or, like, your transatlantic, like, your big jet lag times because you might get your eight hours. But it's not when your body typically would have because, like, in your body's clock it's, like, you know, seven hours before that or after or whatever.

GINA POE // Yeah. It's like trying to take a seven hour long nap and that just, your circadian rhythm is working against you. You'll wake up a lot. You won't be able to do all of the protein building and big, sweet cleaning.

JVN // So, let's say you were, like, an Olympian or, like, you have a really important business meeting or something—like, you're touring like me or whatever. So you would need to, like, for, like, four or five days before you leave, like, start living on their time, like, black out your curtains and, like, eat food at all the times when you would eat food?

GINA POE // That's right. Start shifting your rhythm if you possibly can.

JVN // So if the biggest sleep conference was in Perth and you had to go do the keynote thing. Like, you would live off Perth time for like four or five days beforehand because it's like such a better payoff or would you just, like, fucking ramrod it? Like, just go for, just send it, fuck it.

GINA POE // I have done this and when I don't prepare right, I am awful. My talk is bad. I can't remember words. I can't string a sentence together. It's, it's bad. So the best thing is to actually, for me, to just go early.

JVN // Oh! I need to start acknowledging the importance of sleep in my life. I really feel like I'm getting that, cause it’s—I'm putting some puzzle pieces in here, where I'm, like, “Oh, like that's when my sleep gets fucked up.” And also can I also say I have had the craziest psoriasis flare since Europe? I wonder if sleep is a trigger for me and I've never realized!

GINA POE // Oh, yeah. So if an animal doesn't sleep, the immune system and the metabolism systems both register it immediately. And so your immune system is compromised when you are going through night after night of poor sleep or poorly timed sleep. Absolutely.

JVN // What if someone's listening to this and it's either themselves or, like, a loved one and they're, like, it's even way more fucked up than mine. Like, maybe they've just been, like, feeling groggy or, like, maybe they're realizing that they maybe have, like, how can—do they need to make an appointment with their doctor? Like, how can people try to get in better sleep situations? You, you'd mentioned pets earlier? Like, do we need to, like—well, mine aren't leaving my bed. So that's not gonna be. But maybe for other people. Is that a thing?

GINA POE // Yeah. The National Sleep Foundation has a series. You could just go to the website and it has a series of things you can do to make your sleep better. And if none of those things work, it says, you know, go, go see a doctor because in fact, there are lots of sleep physicians all over and they can look exactly at everything. All these sleep spindles, whether you have sleep apnea, how you're doing, metabolism, all of this stuff. And you can see what you need to do. If, if none of these things are working, if you find yourself suddenly with no lifestyle change, sleeping a lot more or needing a lot more sleep, it's probably indicative of something else that's gone wrong and you need to pay attention to. But all of us have these really fine tuned, amazing systems that you can totally screw up and then fix it. But there's nothing better than just doing what you're supposed to do to take care of it. I just want to say that I also have a dog and cat and they also disturb my sleep several times a night. So I know all about sleep and yet I let it happen.

JVN // And you're a scientist! But there's no, like, once you've fucked it off and got, like, three nights or four hours of sleep or whatever, like, so the damage is that you just didn't process those days' memories and like the insights is good and there's no really getting that back?

GINA POE // Yeah. Unfortunately, that's the case. But, you know, you have a long life, hopefully ahead of you. So, you know, don't look back, just keep looking forward. And if you've screwed up your body by becoming addicted to something, for example, it might be that you have caused some permanent changes into your orexin system, your hypocretin system, to your locus coeruleus and you've made yourself much more anxious, you know, for the rest of your life. But there's still stuff that you can do. One of the things is for example, those who get addicted to opiates. One of the things that long term use of exogenous outside opiates does is it makes you down regulate and you know, reduce the number of receptors for opiates on your stress system and your activation system and your alert system, which is your locus cells. And what opiates, your own endogenous opiates do, is it calms the locus coeruleus. It makes you calmer and happier. Right. That's what opiates, endogenous opiates do. Exogenous opiates do too because it silences the locus coeruleus.

JVN // So, endogenous is inside your body naturally. Exogenous is, like, you introduced it?

GINA POE // That's right. Exactly. Exactly. Endogenous is inside of your body. And you have cannabinoid receptors and you have endocannabinoids in your body also, that's an endogenous system. And the reason why we're susceptible to exogenous cannabinoids is because we have the system set up like it's supposed to be in a perfect balance. Anyway, so if you've used something that makes your locus coeruleus and other areas down regulate, reduce the number of receptors so that you can function at all during the day, then when you take away those exogenous opiates, suddenly you only have a few receptors and your own endogenous opiates can't calm your locus coeruleus like it used to, your locus coeruleus becomes hyperactive. This is a line of research we're doing in the laboratory right now. What does that do to your learning and memory abilities? What does that do to your stress responses. Why do people relapse if they have come off of those drugs and then they have a stressful day or they've slept badly? Why do you relapse? And that's because, you know, it feels awful to be that stressed all the time. And so you want to do anything that

you can to make yourself feel normal again. So there are things that we still need to research but getting good sleep, reducing the amount of stress in your life is a good way to, to try and avoid that relapse and keep yourself on track.

JVN // Damn, sleep is just so important. It's, like, even more important than what I realized. So did I read correctly that some of your early research was on sleep, like, and cats—because I do have five, do we know what happens? Is George really just, like, chasing stuff when he's doing his little cute little running and like nibbling stuff? Like, they're really just dreaming?

GINA POE // Yes. Yes. I love that question. Yeah. Animals dream, too. And the evidence we have of that is if you lesion that same little area of the brain stem that becomes lesioned in us when we have REM behavior disorder, they will have REM behavior disorder, REM sleep without atonia, they will act out a dream. And we can't ask cats or dogs or rats what they were dreaming. But two things, one, we can see what their brain is doing when they're in that dream state and it looks like they're dreaming and acting out the same things that happen during the daytime. And secondly, if you wake up somebody who has the same lesion and is acting out their dreams from that dream, and you ask them what they were doing, they will describe a dream that is perfectly in line with the behaviors that they were expressing. For example, if they were dreaming, they were beating an alligator over the side of a canoe and they have REM behavior disorder, they will be actually, you know, with all their might beating something—

JVN // So, what about a sleepwalker killer do you believe?

GINA POE // Oh, yeah, it's possible, unfortunately.

JVN // Really?

GINA POE // Yeah. But that's not rem sleep, rem sleep is you're completely divorced from the world outside. You, you're acting out a dream that's happening inside of your brain and you have no idea—

JVN // You’re beating the head of the alligator, but it was accidentally, like, your partner. But obviously, but some people maybe lie about that. But then some were real. What do you think is like a sleep expert? Not to veer into a murder porn. But I also didn't mean to…

GINA POE // I had a neighbor that whenever they took Ambien, they would wake up in the morning with a stack of pancakes that they’d cooked in the night. They’d have no memory of that. That's a complicated thing. That's actually a mixture of wakefulness and sleep. It's unconscious state, but it's conscious enough to be able to interact with your environment around you. That's why I say it's not REM sleep because REM sleep, you're not aware of the world. You, you wouldn't be able to walk to the kitchen and turn on the stove and do that whole thing.

JVN // So you're somewhere in 1, 2, or 3.

GINA POE // Actually, you're having a, a simultaneous mixture of a bunch of states of sleep and wakefulness and, and so you can do all kinds of actually very complex things. You can, people can drive a car and not get into a wreck in that dissociated state. It's called a dissociated state because it's a bunch of states mixed up, but they're still unconscious and the forebrain is not working like it's supposed to, they're not able to make all the same judgments and all the same inhibitions. So thankfully, it's rare, some people, again, with sleeping pills, they will go into those states more often than they are or if they're really sleep deprived, various states are all fighting for the same purchase of time.

JVN // So, ok, I got one other, one other Mythbusters or just, like, what's going on. When I, like, the other day. It was like, I think it was, like, the weekend and I was, like, kind of taking a little nap on the couch. But then I had that thing happen where you're, like, "Ah!," you, like, you, like, you're, like, falling down stairs. And that often happened to me when I fell asleep in class, I feel like it's like, not as often when I'm at home, but this is like the nap time was kind of like that. What's that about? Is that a spindle interrupting me or something?

GINA POE // Not exactly known, but it does happen in that stage one to stage two transition. And what I think this is my own hypothesis is that as you fall asleep and your muscles are relaxing, if your whole brain isn't falling asleep at the same rate, if there are parts of your brain that are a little more awake. It might recognize that you're falling, that you're relaxing and then interpret that as an actual fall.

JVN // Oh!

GINA POE // So it, and it happens, that's another sleep onset dissociated state that happens more when you're sleep deprived.

JVN // Is it true that predators sleep better than prey?

GINA POE // Yes.

JVN // But aren't we all kind of predators and prey?

GINA POE // Yeah. Yeah. You're right. You know, for example, even a mouse who is a beautiful prey species can be a predator for crickets. Right? Or other things. So when we feel more, like, strong and like a predator, we probably sleep more deeply and better than when we feel more—

JVN // I'm always ready for some robber, I'm always ready because of Morbid, because of the podcast I listen to. It's like I'm always ready for someone to fucking be in here. I'm always ready to kill a bitch. You know, I just, I, I feel like I'm more of, like, a prey species. Like, I'm more worried.

GINA POE // Yeah. But getting ready helps make you more of a predator.

JVN // Oooh!

GINA POE // So it helps you sleep better. Right?

JVN // Okay, so what drew you to sleep as an area of expertise? Like, when did you just, like, wake up and, like, you, was it, like, Elle Woods vibes where you're, like, "I'm butt crazy in love with neuroscience," or, like, what happened? No,

GINA POE // it was a gradual, back door kind of thing. I didn't think I would ever be a scientist. I thought scientists lived isolated, lonely intellectual lives and it just didn't sound like any fun to me. I went to Stanford as an undergraduate and I knew there was a great sleep scientist, Bill Dement. Every summer, he did lots of sleep studies in one of the frat houses. And I used to walk past because I still worked at Stanford in the summer. I was, I had to work and go to school. At the same time I didn't work in a research lab because I needed money. And I thought you had to volunteer and I needed, I needed that time to work actual jobs. There are actually lots of opportunities. If any of your listeners are undergraduates, there are lots of opportunities to get paid in a research lab. In fact, don't let yourself not get paid or at least get credit. But anyway, I, I was clueless. I didn't know so and I, I didn't do any research. I would walk past these rats and think, "Oh, they're the mad scientists on the hill studying sleep." But my senior year I took one class called Neurophysiology. It was the first neuro class that I'd ever taken. And the very first lecture

was given by a lecturer named Craig Heller who was studying thermoregulation. And he said that he discovered that during REM sleep, we stopped thermoregulating. And thermoregulation is so important for our bodies, right? To keep it in the right thermoneutral zone. You know what bad things happen when you have a fever or hypothermia—

JVN // Is that why we wake up super fucking hot sometimes? Like I wake up and I'm, like, "Fuck, I'm hot!"

GINA POE // It could be, it could be. We are certainly burning a lot of energy when we're in rem sleep. Our brains are really active. But anyway, so we stopped thermo regularly, which is just crazy. And I thought, "Wow, that's kind of cool that this guy in front of me could just discover that," that one person can discover such a fundamental thing. And then I needed a job after I graduated and started working as a research assistant. And that's when I realized research is so much fun. It is putting pieces of the puzzle together. It's finding pieces of the puzzle. It's very interactive. People are always talking to each other. I was just like, "Wow, this is amazing." I still was thinking though, I would be a public health advocate of some sort. Then, after I went to my second sleep conference where I realized, "These are the experts in the world and they have no clue why we sleep. And I can ask questions, too."

Then when I was doing my PhD, they had you TA for classes. So I had to teach for the very first time. And I'd never taught before. And I thought, "Oh, this is going to be hard. I never wanted to be a teacher. I thought, oh, they're overworked and underpaid and under, underappreciated." But it was also an interesting challenge and fun to see the light go on in people's eyes when you were able to explain something, right? And there were times when I couldn't explain it, but there were times when I could. And then I said, "I've got this burning question, I've got to know the answer to it. I'm going to apply for a grant. It's for $250,000 a year in order to fund me and a couple other people to look at this and to, you know, ask the question." And then when I got the money, I was, like, "I cannot believe it. All I have is a degree and an idea and they're throwing a million dollars at me over five years to answer this! And, this, like, this is crazy!"

JVN // Did you answer your question?

GINA POE // I did. I did. And this is the, the question that we answered before, which is that REM sleep is really important, not only for putting new things together, but also for breaking things apart. So you can change your mind.

JVN // Oh my God, that is so freaking cool. So what projects are you and your lab work—because now you have your own lab?

JVN // Yes, I do. I do. Yeah. So we're working on so many cool projects right now. I have six graduate students. Each one of them is brilliant and doing such fun stuff. So one is the basics of how we feel something is familiar and know that it's consolidated. So you can stop erasing it and you can go on and, and work with it. So that's a very basic memory consolidation question, Michelle Frazer in my lab is doing. And then we're doing opiate research. You know, what is it that opiates do to sleep? And is it real sleep when you're on opiates? Or when you withdraw from opiates, why is sleep so stressful and so broken up? If you correct sleep after withdrawal, can you reduce the withdrawal symptoms? Can you improve memory? Can you make it less likely that people will relapse? We're gonna write a grant for that this fall post traumatic stress disorder. We talked about that. If you go to sleep when you're still stressed, does it make sleep maladaptive? And how do you reverse that? Right now, we're using some really out of patent drugs that are really super effective for preventing or reversing PTSD in animals so far. And we're also gonna try and teach rats to do some deep breathing exercises, meditation, kind of deep breathing exercises to see if they can prevent PTSD with that.

So that's, let's see, 3, 4—sleep for insight is another one we are doing. So when rats are trying to learn a very difficult problem and put two things together that they haven't put together during wakefulness, even though they tried, do they wake up, find the solution during sleep, and then act on it when you're awake. And in fact, that seems to be the case as well. So the last one is the one we're doing with humans, which is do all the parts of your brain sleep? Are they all in the same sleep state at the same time normally? And so you talked a little bit about why some people never remember their dreams and other people do anyway, the whole dissociated state thing, how abnormal is, it turns out it's not abnormal at all. In fact, it might be that those people who can lucid dream and direct their dreams can do so because two parts of their brain are in different states. One's in a dream state and one's in wakefulness state or another state so that you can better direct your dreams. And that's Rockelle Guthrie is doing those studies—and turns out to be pretty normal, actually.

JVN // So you kind of do do public health. I mean, you're doing so many things that matter so much to public health. It's just through neuroscience and sleep, which is so freaking cool.

GINA POE // Oh, thank you!

JVN // My final question. I have—this is, like, my most, we did so good. I can't see it. What's the biggest mystery about sleep slash, like, what do you hope to answer next?

GINA POE // Well, I hope to answer all of those questions that I posed to you. You know what happens when we get addicted? What happens with post traumatic stress disorder? How do we know that we've consolidated memory? How do we do that memory consolidation? How do we form insights? How does the brain sleep? All of those things. But all of those things, although they are all related to life and life-sustaining functions aren't the reason why we *have* to sleep. They won't kill us if we don't sleep, right? So I would love to know what is the essential—why does every single animal in the animal kingdom sleep? What is the essential function? And I think it has something to do with something I'm not studying at all. But other people are, which is metabolism. It's our mitochondria, it's energy, it's, it's repairing our DNA. That's what I think it has to do with. So, if somebody wants to study that, please do, I think you'll win the Nobel Prize and I would support that.

JVN // Gina Freakin' Poe. I have literally had so much fun. I learned so much about sleep. You're amazing. Thank you so much for coming on and Getting Curious. We love you.

GINA POE // Thanks so much for having me! I loved talking with you, Jonathan.

JVN // You've been listening to Getting Curious with me, Jonathan Van Ness. You can learn more about this week's guest and their area of expertise in the episode description of whatever you're listening to the show on, honey! You can follow us on Instagram @CuriousWithJVN. Our editor is Nathanael McClure. Getting Curious is produced by me, Erica Getto, Chris McClure, and Allison Weiss. With production support from Julie Carrillo, Anne Currie, and Samantha Martinez.

Everyone, before we go, I wanted to just pop in and say, thank you all so much for listening to Getting Curious. I always say that, like, 85% of what I've learned from the world is from this podcast. So we hope you're loving the show as much as we love making it. And also, we want to hear from you, queens! Just head to gettingcurious.fans, that's gettingcurious.fans on the browser of your choice to answer a few quick questions. We're so excited to hear from you. Bye, Queens!