

Transcript: Sleep Junkies Podcast Episode 018

The Nocturnal Brain with Guy Leschziner

<https://sleepjunkies.com/nocturnal-brain-guy-leschziner/>

- Jeff Mann: 01:36 Good morning. I'm sitting here today with Dr. Guy Leschziner and he's very kindly invited me down to Nuffield House, which is the location of the Sleep Disorders Centre at Guy's and St Thomas' Hospital in London. Thanks very much. And good morning Guy.
- Guy Leschziner: 01:53 Morning.
- Jeff Mann: 01:54 Let me give you a brief introduction. Guy is a consultant neurologist at the Sleep Disorders Centre at Guy's and St Thomas'. You're the clinical lead, is that right? So you head up the clinical team here. He's also a reader in neurology at Kings College and you do clinics here in neurology and sleep disorders and epilepsy. You also lecture and you've got lots and lots of research interests in various sleep disorders.
- If that's not enough, also in the last couple of years, Guy has also been heavily involved in some public education projects. One of them we're here to talk about specifically, which is a new book. It's a great book, called The Nocturnal Brain. We'll talk a little bit more about that later. And also you've recently done a three part series on BBC Radio Four and a TV series, the Secrets of Sleep. Now, how do you manage to fit all that in?
- Guy Leschziner: 02:49 The answer to that is with great difficulty. I think it's always a bit of a juggling act and certainly it's a case of prioritizing certain projects at any one time. So I think probably everything suffers including personal life, but it's just a case of trying to achieve that right balance.
- Jeff Mann: 03:09 So it's probably an impossible question, what's a typical day for the clinical lead at Guys?
- Guy Leschziner: 03:15 The typical day is much like any other consultant really. I do clinics and I do ward rounds on the neurology side. Some management issues, particularly in terms of dealing with a very big service like the Sleep Disorder service here. We've got, I think at last count 15 or 16 doctors of which the vast majority are consultants that work within the sleep disorder center.

03:43 So you can imagine that when you're running a clinical service trying to get commercial and research trials going and all the management that comes with being within a large bureaucratic organization like the NHS, that keeps you pretty busy.

Jeff Mann: 03:59 So I wasn't aware, I'm actually just down the road from here. I'm two stops on the metro, but this is one of the largest sleep units in Europe, I believe.

Guy Leschziner: 04:07 I think that it's very difficult to get figures, but certainly in terms of the number of doctors that we have working here and the number of patients that we see every year and the number of sleep studies that we do every year, we're certainly one of the largest centres. And when I talk to colleagues from around Europe, I think that's very much their view as well in terms of comparing numbers.

04:31 What I think marks us out as a sleep center is that we are one of the very few sleep services that first of all have what we term a lifespan sleep service. So we work very closely with our pediatric colleagues who are based at the Evalina Children's hospital and in fact, we run joint clinics together to enable people to transition between pediatric and adult services, but we also are a proper multidisciplinary service in that the consulting staff that we have here come from a variety of backgrounds.

05:06 So neurology, respiratory medicine, psychiatry, neuropsychiatry, we have inhouse psychologists as well, so we really do run a multidisciplinary service. In fact, I think that it's actually very, very difficult to provide a proper sleep service without having that kind of multidisciplinary service. We meet on a weekly basis and discuss our difficult patients because it sounds really obvious, but sleep is as a result of the confluence of a variety of factors, biological - and those biological factors can be neurological, respiratory or cardiac, psychological, environmental, and behavioural.

05:51 And it's difficult to address some of the sleep disorders that we see looking at it just from one particular angle.

Jeff Mann: 06:00 Yeah, absolutely. I'm really interested in this concept of sleep medicine. If you look at the States, you have big bodies, you've got the American Academy of Sleep Medicine. Now we don't have anything like that in the UK. So what are your views on the way that we approach sleep medicine as a whole in, let's just stick to this country?

Guy Leschziner: 06:22 So I think you've highlighted an important issue, which is that there is no formal training program for sleep medicine in the UK. So historically sleep medicine in the UK has primarily been driven from little silos, primarily respiratory medicine. So for many years sleep medicine was largely seen as sleep apnea and insomnia and the psychiatrists took on insomnia and the respiratory physicians took on sleep apnea. Occasionally a neurologist would come in when there was a question mark as to whether or not something that was happening in the night was epilepsy or not. But it was all done in a very disjointed way. I think to some extent that is still very much the case. And certainly speaking from my own experience, much of what I've learned about sleep medicine has come from working alongside, not in different buildings or different centres, but really side by side with my respiratory psychiatric neuropsychiatric and psychological colleagues.

Guy Leschziner: 07:25 And without having that exchange of ideas and that exchange of experiences and expertise, I think it's very difficult. So you practice sleep medicine in its fullest sense. There have been some noises made particularly by some of my colleagues and also through the British Sleep Society to try and develop a proper core curriculum for people who want to pursue a career in sleep medicine. But it's very difficult to make headway because it does sit in an area of medicine that is not very clearly defined.

Jeff Mann: 07:59 I know there's some people in Oxford putting courses through to train people on a postgraduate level.

Guy Leschziner: 08:05 Yes, there's a Masters in sleep medicine in Oxford, but I think that's not primarily focused at clinicians, at doctors. It's a more broader course. But in terms of medical training, in the same way as when we do neurology, we have to do our general internal medicine. Once we fulfilled our five or six years of curriculum and expertise, then we are given something called a certificate of completion of training, which says you are now a consultant neurologist. We don't have anything similar in sleep medicine.

Jeff Mann: 08:38 So there's no such thing as board certified in sleep medicine or anything like that?

Guy Leschziner: 08:42 No. There is a European exam now, which some of our juniors are doing, which at least gives them some sort of qualification in sleep medicine. But it's not the same as calling yourself a consultant neurologist or consultant respiratory physician.

Jeff Mann: 08:59 What are your candid views on that? Is that helpful or does that give more flexibility in a sense that you're not working in such strict parameters?

Guy Leschziner: 09:07 Well, I think there are pros and cons. I have to say, I think the cons outweigh the pros. So the pros are that people come from lots of disparate environments and can develop an interest in sleep regardless of their past experience. But that's also a con. It means that there are a lot of people who have a very limited view of sleep medicine and only see it from one particular perspective. And that sometimes I think is at great detriment to the patient sitting in clinic hoping to get a fully formed opinion about their sleep issues.

Jeff Mann: 09:38 Yeah. So it could depend on their particular ailment, which specialist they're talking to, how far deep down the rabbit hole that person's actually got into into sleep.

Guy Leschziner: 09:45 And I think it can also result in people with sleep issues, seeing a variety of different clinicians and being passed around, which is sometimes deeply frustrating for the patient. But it's also frustrating for the clinician as well. It delays people getting to the right diagnosis. It delays treatment.

Jeff Mann: 10:05 So the average GP, I looked into this a little bit in the States, they'll get two, three, four hours maximum specialist training in sleep. Not sure what the situation here is in the UK

Guy Leschziner: 10:16 Probably worse.

Jeff Mann: 10:17 So that's not optimal really is it? So how would you see that progressing? How would that start to happen?

Guy Leschziner: 10:24 Well, I think that there have been some changes recently. A lot of medical schools are now at least putting sleep on the curriculum at medical school. And I guess that one of the purposes of what I've been doing over the last few years is to try and spread the word of, of sleep medicine to make people aware.

10:43 We're very good as doctors in general talking to each other and lecturing at each other and telling our stories to each other. But one of the things that I unfortunately realized quite late was actually the value of us telling stories is probably greater when we tell those stories to the general public because the general public are the people who are experiencing these disorders and spreading the knowledge that these disorders first of all exist

and secondly that there are treatments available for these disorders is actually perhaps one of the most valuable way is that we can communicate more broadly to bring people to recognize the fact that they've got a condition, to recognize the fact that they can potentially get treatment for that.

11:30 And actually when we talk to the general public, there are plenty of doctors reading these books or listening to these radio programs or watching these TV programs. Books like Matthew Walker's book have really done amazing things for bringing sleep to the forefront. His book is very much about sleep and sleep deprivation rather than the sleep disorders that we would typically see in our clinics..

Jeff Mann: 11:57 Watching the Channel Four series, it's such an accessible medium for people and you see real people and most of these people have no idea of what's going on with their sleep. And it's something that I've picked up on over the years that there is just this massive education gap. So I think as you say, giving the public the opportunity to find out these things first and then maybe next time they go to the doctor they'll say, oh, I saw this program on TV last night and he said that this kind of condition exists. So maybe there's this sort of a bottom up kind of thing that could work.

Guy Leschziner: 12:30 Absolutely. In the book I describe a case of somebody who was diagnosed with quite severe sleep apnea and actually the diagnosis eventually came from her because she had been going to her GP for years and years saying, I feel dreadful, I feel tired, I don't know what's going on. And then actually she came across a video, which was summarizing sleep apnea while she was waiting in the doctor's waiting room. And she went into a GP and said, I think I've got sleep apnea. And that was how she was diagnosed. So sometimes it's a case of patients being armed with the knowledge to educate the doctors.

Jeff Mann: 13:15 GP - there's a lot of American listeners, that's your general practitioner. So that's your doctor who's your first point of call here in the UK. And then if you've got a specific ailment, you'll get referred to a specialist. If the GPs aren't being trained in sleep, then having programs and books and radio programs like this is better than doctor Google at least

Guy Leschziner: 13:35 I think one of the other things to say, is that although there's little in the way of formal education of sleep medicine, there are some issues which I think at least in the UK have really come to the fore in primary practice, in general practice.

13:50 For example, this move away from sleeping tablets, longterm sleeping tablets. So I think that those kinds of changes in prescribing behaviour, I think do drive people at least to explore those kinds of conditions that they're seeing and to educate themselves about the probably hundreds of patients that every general practitioner sees with insomnia every year. So there are some changes afoot that perhaps are outside that formal educational setting.

Jeff Mann: 14:23 Yeah. Try and get back to some of my original questions.

Guy Leschziner: 14:28 Sorry, I'm deviating

Jeff Mann: 14:30 No, I love it. So just going back to your background, I wondered if you could just sort of precis your journey into sleep. And also maybe for the listeners explain what a neurologist does. And the reason I'm asking is because this idea of sleep medicine,, in America again you go see a sleep doctor, but that doesn't happen here. You'll see a specialist as you were saying. And you trained in neurology and also you did your PhD in epilepsy and the genetics of epilepsy, which some people may not associate with sleep at all. So I'm just wondering if you could explain that route and how you've got to where you are, where you're, you're actually heading up a very big team of specialists in sleep medicine.

Guy Leschziner: 15:16 So I always knew that I wanted to do neurology as a specialty. I was always fascinated by the brain. It really is the organ that defines every aspect of our being, every aspect of our consciousness. But when I entered into specialist training, as part of that, we had to do research and I ended up doing a PhD as you say, in epilepsy prior to then going back into the higher training.

15:45 So during that higher training, it's about developing the experience and the expertise to diagnose and treat a range of neurological disorders as varied as carpal tunnel syndrome to epilepsy, to dementia, Parkinson's disease, a whole range of things. So really dealing with every aspect of the nervous system. And that ranges right from the cerebral cortex, the outer lining of the brain, all the way down to the muscles. The muscles are viewed as part of the nervous system.

16:16 But during that PhD where I was very much focused on epilepsy, I developed a sub specialty expertise in dealing with epilepsy, the diagnosis and the treatment of epilepsy. But actually they're all some parallels, significant parallels actually between epilepsy and sleep medicine.

- 16:33 For a start using the EEG, the brainwaves to classify sleep stages, to study sleep, but also as a diagnostic tool for epilepsy. The range of drugs that are used, there is a significant overlap. But also historically one of the key areas for the neurologist in the area of sleep medicine was to differentiate strange things that happen in the night from epilepsy.
- 17:02 And so that's where the role of the neurologist and epileptologist in particular developed in terms of sleep medicine. I was always to some extent fascinated by sleep. And I remember that as part of my undergraduate degree, I did a module on what was termed at the time physiological psychology.
- 17:21 And I remember being asked to go away and write an essay on the function of dreaming and came across the Crick paper from the 80s about the function of REM sleep and being totally fascinated. But actually, when I was going through training and seeing a lot of epilepsy patients, it became very clear that as well as there being epilepsy in the differential for a range of sleep conditions, sleep in itself was a very important influencer of control of epilepsy and indeed the control, the management of a whole range of other neurological disorders like migraine for example.
- 17:57 And it was really at the end of my training that I decided to take some time out of my training and I essentially created a fellowship for myself, spending time, at the National Hospital for Neurology, but also here at Guys and Thomas', really as I was nearing the point at which I was going to be a consultant and in order to increase my experience and expertise in sleep, that's really how it came about.
- Jeff Mann: 18:26 So during this time, lots of training, lots of specialization and you say in your book that today, in 2019, people are thinking differently about sleep. So obviously there's been a lot of advocacy and awareness. You mentioned Matthew Walker's book, but what, what are your overall views about why that's changed and you know, contrast today and maybe at the start of your inklings of getting into this area?
- Guy Leschziner: 18:51 I think our knowledge base has increased exponentially. We have a huge amount of research being undertaken all around the world, both in terms of normal sleep and the functions of normal sleep, but also in terms of sleep disorders. So we are much more aware now of the longterm implications of poor sleep or of sleep disorders in terms of our physical health and our neurological health sits within that.

19:26 But also in terms of our psychological health as well. So some of it has been driven by the primary research and perhaps secondary to that primary research is the communication that is being done, the public engagement that is being done that really helps people understand the importance of sleep to their everyday lives.

Jeff Mann: 19:46 Yeah, it's a tricky balancing act. From my perspective, because for so long it's been , you know, sleep when I'm dead, that kind of thing. And now we're kind of slightly bombarded by this. So I think there's a balancing act between the instinctive common sense idea of sleep and then all the cutting edge research that we're finding out.

Guy Leschziner: 20:05 Well, I think you've hit the nail on the head really. My slight anxiety about the media attention on sleep is that we have lost a common sense view of sleep. I think people are now so obsessed with measuring sleep with, even to some extent there's a degree of moralization about sleep as well, that actually this can in some individuals create problems rather than solve them.

20:35 Because one of the very common things, that I see are people who have historically had poor sleep and we know that that often runs in families. It's often genetically predetermined, but then they read a range of articles or books that tell them that they're going to die younger, that sleep makes you look better, it makes you more intelligent, it makes you more creative and it stops you from getting Alzheimer's and a whole range of other conditions.

Guy Leschziner: 21:01 And so their anxieties about sleep increase exponentially and then they end up with a very severe insomnia. So it's trying to get that balance right about making sure that people are aware, making sure that people value sleep and not seeing sleep as the be all and end all. Because it's one aspect of our lives. It's a very important aspect of our lives, but it is one aspect of our lives. It's not the be all and end all.

Jeff Mann: 21:28 I think there's big room for that kind of angle. Yeah, we know a hell of a lot of sleep, but it's not all doom and gloom.

Guy Leschziner: 21:35 Well, we know a hell of a lot about sleep but we also don't know a hell of a lot about sleep. So if you look at some of the studies that have been done, very large scale studies, you know, we are involved in a study at the moment that's using the UK Biobank, which is this huge collection of individuals - looking at sleep in the UK Biobank cohorts.

- 21:55 But actually if you look at the information there is about sleep in those individuals. It's very, very limited. So we are drawing conclusions based on limited data. And I think that until we've got to the point where we can measure sleep properly in huge numbers of people for very, very long periods of time, some of those questions are going to remain unanswered.
- 22:19 And so what, I'm very keen about, I do stress this in the book is that actually some of the tools that people are using too metricize asleep are not overly relied upon and actually don't achieve the increase of anxiety about sleep. Because I think that that's a very real phenomenon. People need to relax a little bit about sleep as well.
- Jeff Mann: 22:43 It's a tricky one, isn't it? We want the information and at the same time we need to not stress out about the bad things we hear. So let's talk about the book and also the radio and the TV. This has all happened in the last couple of years I believe. So it's quite new, but it's had a lot of comparisons. People have compared it a lot to Oliver Sacks, the late Oliver Sacks who told a lot of stories, case studies, but wrote very beautifully about the strange ailments of his patients are. I can really see the comparisons.
- 23:14 So the book's called the Nocturnal Brain, subtitled Nightmares, Neuroscience, and the Secret World of Sleep. And it's structured in a really nice, sort of easy to digest format in the sense that each chapter deals with a specific subset of sleep disorders. But it's based on your personal case studies. These are all cases that you've dealt with. And then you'll slot a bit of science in there and a little analogy in there. So how did that come about? You're a busy guy, you've got a lot going on in your career?
- Guy Leschziner: 23:43 Well if the truth be told it was a bit of an accident. I mean, if you'd have said to me three years ago that I would be doing all of this, I would have laughed. I think that the radio series really was the thing that came first despite the fact that the TV was broadcast earlier.
- 23:57 And that really came about from a couple of chance meetings really with somebody from the BBC who I'd met at some social event. And we got chatting and he said, Oh, you know, you should come and discuss this. And at the time I thought, actually, you know what, I'm far too busy I can't do this. I don't want to do it. And I ignored it. And then two years later I was in a slightly different situation whereby, I think I alluded to some of the frustrations with managing a large service.

- 24:32 And, and I think I just thought, actually, you know what, I do need perhaps something outside the NHS to distract myself. And so I really explored it and went through a commissioning process and there were a series of levels of whittling down those. And I ended up having to go and talk about the idea to a room full of commissioners.
- 24:56 And eventually that got commissioned. And it was really purely by chance that at roughly the same time I got a phone call from a TV production company who said, look, you know, we want to do something slightly different in sleep. And I think they chatted to one of my colleagues who works down in Exeter who had given them my name. And at the time I think I was just in that mental place where I just thought, well, why not, sod it?
- 25:20 And that's how those came about. The book, as I said to you, I think before the interview started, I never had any intention of writing a book. I was always the person when chatting to my friends and everybody would say 'oh, I've got a book inside of me', I was the person that said, actually, I'm pretty sure I don't have a book inside of me.
- 25:39 But actually off the back of the radio series, I got approached by a literary agent. He said, well, have you thought about writing the book? And once again, my first instinct was to say no, but he said, well, look, Christmas is coming. What are you? Try and write a chapter and see whether or not, you like it. And then when I sat down I realized, I really enjoyed the, the process of writing to a slightly different audience. Yeah. Yeah.
- 26:05 As I was writing it, my English teacher's voice was ringing in my ears and I thought, God, this is never going to happen. But actually once I sat down, it came very, very quickly.
- Jeff Mann: 26:16 Right. So you, you weren't sort of sitting there for five 30 in the morning. I said, come, come to me, inspiration...
- Guy Leschziner: 26:21 No, it was, it was literally, you know, I would go on for a couple of hours when the kids were at whatever sports club they were at on a Saturday morning or in the evenings and two or three hours here and there. So it was, it was a surprisingly painless process.
- Jeff Mann: 26:37 I think the storytelling aspect is a really good one. We were chatting earlier about this idea of getting knowledge out into the public sphere and, and maybe filtering upwards to the medical community. So the clinic here, you don't deal with

primary insomnia. And I'm relating this to the book because the book talks about types of sleep orders that are rooted in neurological and breathing problems, things that come from the body or psychiatric places rather than primary insomnia.

Jeff Mann: 27:04 And so, I just wondered if you could make that kind of distinction because some people think I've got a sleep problem, I need to go to the sleep disorders clinic, but you might turn some of these people away and, and refer them elsewhere.

Guy Leschziner: 27:15 The reason why we don't see primary insomnia - and so what we mean by primary insomnia is insomnia without any other obvious underlying cause - is purely a question of capacity. As you know, insomnia is a very, very common sleep disorder. It's probably the commonest. So chronic insomnia affects about one in 10 adults. We here don't have the capacity to deal with those very, very large numbers of patients. And because we are really quite specialized, it would essentially break our service.

27:47 So we work very closely with a specific insomnia clinic that is based at UCLH, which is just north of the river, but they are set up to deal with pure insomnia on a much larger scale. But what we have done here is we recognize the fact that there are many people who don't necessarily present with the classic picture of insomnia but have insomnia or, or a psychological root for their sleep disorder as the basis of their issues.

28:21 So we have set up a service to deal with the psychological side of their sleep disorders and we now employ a psychologist and an assistant psychologist and we have other people delivering psychological treatments like cognitive behavioral therapy for insomnia because a huge number of our patients have more than one issue but to try and deal with their issues across two hospital sites just doesn't make sense. It doesn't make sense in terms of the quality of care that we deliver and from a patient experience point of view, it's terrible. So that's why we've divided up our services like that.

Jeff Mann: 29:03 Sorry, went off track a bit there, but I wanted to relate that to the book. So the type of people you're saying that and the type of people we write about in the book, some common conditions like sleep apnea, but also a lot of let's say, exotic conditions, in terms of sleep disorders, parasomnias and circadian rhythm disorders, unusual behaviors during sleep.

29:24 As I said, there's a lot to delve into here, but maybe if we can pick one specific example that I found really, really interesting and it was your, your specialization early in your academic

career. You talk about a patient, Janice in the book who presented to the department here with a condition that was affecting her sleep. And it was, it was a bit of a mystery at the start and it ended up turning out to be a form of epilepsy.

29:55 I was really surprised, not that I'm a doctor or a scientist or medical guy at all, but you've described epileptic seizures as large areas of synchronous electrical activity spreading through the whole brain. And then you go on to say that sometimes that electrical activity is localized and then sometimes things that happen in sleep, sleep stages can trigger that electrical activity, which can sometimes manifest into form of epilepsy.

30:24 That must be quite interesting to try and work and figure out what, what that is. I wonder if you could just talk about the case of Janice in that instance.

Guy Leschziner: 30:33 Yeah. So Janice presented with recurrent choking attacks at night and was screened on multiple occasions for obstructive sleep apnea, which is obviously the commonest cause of that. And those investigations always came to nothing. She came from quite a troubled childhood, which I detail in the chapter and unfortunately for her, her nocturnal choking attacks were put down to psychological disturbance and she was treated with a range of psychiatric medications.

Jeff Mann: 31:08 Could you just explain that a bit more? Because it was pretty horrific, what was happening to her?

Guy Leschziner: 31:13 Yeah, so she would be woken up sometimes as many as 50 times a night with a sensation of choking or gasping that led her to become very fearful about sleep to such an extent that she was trying to sleep deprive herself to prevent her going to sleep and experiencing these really rather unpleasant sensations. So she would wake up feeling like she was being strangled or suffocated.

31:37 To cut a very long story short, essentially what was found to be the problem was that she had epileptic seizures arising in a very deep part of her brain called the insula, which is really the area of the brain that's responsible for sensation in the throat. Now the association between epilepsy and sleep has been known about for centuries. In that we know that sleep deprivation is a potent trigger for seizures and that certain seizures have a prediction for arising at night.

- 32:10 There is something about the change in brain state in sleep that seems to facilitate the generation of certain types of seizures, predominantly seizures arising from the front of the brain, frontal lobe epilepsy, which for many years was not really recognized as epilepsy in some cases because one of the issues with seizures arising from that part of the brain is they often arise very deep and the EEG, the brainwave test that we have really only records electrical at the surface of the brain.
- 32:41 So you may see apparently normal activity during these events. And it was only at the turn of last century that we really understood that many of the things that we were seeing were actually epileptic in origin rather than non epileptic.
- 32:58 So in her case because this area of the brain is very deep as well, it wasn't being picked up very easily on the brainwave test, but actually we use some other techniques to demonstrate the fact that these events we're actually seizures that were resulting in that sensation of being choked. And treatment of her epilepsy resulted in a dramatic improvement in the quality of her sleep.
- Jeff Mann: 33:22 And this was something that was happening from early childhood, right?
- Guy Leschziner: 33:26 Yes, it was. It was happening from when she was initially taken into care because of family circumstances, which I think is in part what drove people to think that these had an underlying psychiatric or psychological origin rather than an organic and biological cause.
- Jeff Mann: 33:47 This is one of the takeaways I got from the book and also from the TV series, just people completely unaware of the types of conditions they were having in their sleep. I guess all of these things, these education projects and the book and the TV and the radio is really valuable. Just putting the message and putting the information out there. And you also talk about narcolepsy in the book, sleepwalking, sleep, motorbike riding, so loads of interesting stuff in there.
- 34:17 There's a really interesting analogy, you touched on it just briefly there, about this idea of brain activity and the EEG, which is the gold standard for measuring sleep. And you give an analogy, say let's say you're asked to map the floor of the ocean, but you were only given a snorkel and a mask. I love that analogy because you're basically saying the EEG in terms of looking into the brain is like being given a snorkel.

- 34:50 There was a paper that came out recently. We're normally used to a few stages of light sleep and deep sleep and REM sleep, but they put some patients in an fMRI scanner and they clocked 19 different brain states. So the tools that you've got at your disposal, really, it must be quite frustrating when maybe you see someone presenting with some symptoms and you think, it could be this, but I need more tools, more weapons.
- Guy Leschziner: 35:18 Oh, absolutely. I think the people that you're referring to actually came out quite a while after I wrote the book. But I think it is very supportive of the view that essentially our way of looking at sleep is based upon very incomplete information. So the staging of sleep, or the classical staging of sleep is based upon very limited data. So with, with the new tools that are, becoming available, we can really try and delve a little bit more deeply into sleep.
- 35:53 And I think that one of the things that I hope has got across from the book is the fact that actually, even though there are these four classical stages of sleep, what we know, even using the EEG is that different parts of the brain can be used in different stages of sleep. So there are all these transitions between even the classical stages of sleep that explain a lot of the phenomenon that we experience, both in normal sleep but also in people with sleep disorders. Things like sleep, walking like lucid dreaming, like sleep related hallucinations or sleep paralysis.
- 36:34 And I think that what we really should be viewing sleep has is a spectrum of different sleep states rather than pure stages. Even scoring a sleep study using the standard methodology, you often see patients in whom you're not quite sure whether or not they're in stage one or stage two. And so there are these blurred boundaries everywhere. Now the study that you refer to using functional MRI and EEG looked at connectivity states, but I imagined that these 19 stages of sleep that they identified, even then, if you were to look at a bit more detail, you would probably see gradations within those,
- 37:24 So sleep is a dynamic process. It's not a static process and it's not a global process. It's a local process. So really our view of, of sleep as being this binary state of being on the role has clearly died. But I think that what will eventually probably die is the view that there are all these very clearly demarcated sleep stages.
- Jeff Mann: 37:54 Yeah. We look at the hypnogram and it's a square graph.

Guy Leschziner: 37:58 I think we're probably going to be looking at curves in the future.

Jeff Mann: 38:01 Yeah. And this idea of hybrid states, you know, lucid dreaming, you mentioned, we're asleep, but we're conscious. I wonder, just to round up if you could just maybe give a couple of predictions about the future of sleep medicine and let's pick a number, maybe 30 years in the future. Put you on the spot there.

Guy Leschziner: 38:25 Wow, always a difficult one. I think that our knowledge of normal sleep and the implications of normal sleep will have moved on significantly. I think that once we have tools to be able to track sleep long term in large cohorts of individuals - and when I mean track sleep, I actually mean sleep rather than the sleep trackers that we currently use, which largely just track movement and heart rate and other physiological parameters - then I think that that will enable us to unravel some of the complexities in the associations that we see between sleep and disrupted sleep and physical and psychological associations. So I think that will be a huge leap forward. I think that the use of big data alongside that I think will help significantly.

39:21 In terms of the practice of sleep medicine, some of these tools that are available at the moment on a research basis will hopefully start percolating through to the coal face, but that's going to be a significant period of time because at the moment these techniques are hugely cumbersome and hugely expensive.

39:42 So, you know, fMRI, EEG, we've tried to do that a couple of times on a research basis. It's very, very difficult. Now maybe the technology has come along that make that much more straight forward. I would hope that's the case. Um, but it's impossible to predict.

Jeff Mann: 39:59 That's what keeps us interested. Well it's been really super interesting. I wish I could sit here and talk to you longer, but you've got things to do with the patients to see and all that. Thanks very much Guy.