Academy of PHYSICAL MEDICINE

Transcript

Sleep Science
With Neil Stanley

APM- My guest this evening is Dr Neil Stanley. PHD. Urm he's been involved in the science of sleep for over 35 years now. He started out with the neuro science division with of the royal air forces institute of aviation medicine. He moved to surrey university where he set up and ran a large sleep unit, he was the director of sleep in their human pyscho-pharmacological research unit. And has since been a member of many sleep organisations across Europe and the world and indeed was the chairman of the British sleep society, who knew we had a sleep society. Maybe Neil, welcome to the studio.

NS- Good evening.

-It's great to have you with us.

-It's a pleasure.

- But isn't that part of , that comment I made there, isn't that part of the problem here, that everybody thinks that sleep is just something we all know about, and we didn't know that there were scientists looking at it?

- Well I think that is a problem. I think it's a universal phenomenon. We all do it. Everybody did it in the last 24 hours, and everybody's going to do it in the next 24 hours. Whether you like it or not, you can either do it well in your own bed, comfortably, or you can do it driving up the motorway in a car, when you

don't want to do it. So you have to sleep. And people just think well, yeah we've got to do it. It's something that we have to do, but the science of sleep and the information about how to get a good night sleep, is sort of neglected. As you say, we've actually got the second largest sleep society in Europe, and yet bizarrely, probably through British reserve, they are the least active. So they never appear in the press, they never have spokesmen appearing in the press, and they don't even have a patient facing thing on their website. It's just for the members.

- And you would have heard every joke possible about why we never hear from the sleep society won't you, so I'm not going to go down that route.

- There are a few key jokes that have been around for a while.

- But it's nearly, the fact that you've been into sleep research for as long as you have, the fact that there is a sleep society, the fact that you've been setting up sleep research units, means that there is some science behind this, and actually perhaps we should be paying attention.

- Yeah, sleep for years has been neglected, and when I say years, I mean 3,000 years. Aristotle wrote about sleep, and like anything else from Ancient Greek, that just remained constant, his idea that it was about drawing the warmth from the brain into the stomach allowed the brain to sleep. That kept very, very constant. And nobody mentioned about sleep, because to be honest, it was pretty easy to get a good night's sleep. You went to work, you came home, you had your tea, you went to bed, you had sleep. You got up, you went to work, came home. It just was a cycle. There was nothing to compete about--

- You say it was easy to get a good night's sleep, is that quite--

- I think, yeah I think a good night's sleep, I think people did you know after the Tudor times when we started building buildings out of substantial material, and we started having chimneys to vent the smoke so we could then construct bedrooms and that. I think for at least the last 600 years, people have been able to get a good night's sleep. The problem is, that we then didn't talk

about it. Because Shakespeare, and people like Shakespeare around 1600 wrote about the importance of sleep in drama, and then it went quiet. The first book about sleep in the English language was 1830. The first self-help book for sleep, was actually 1889. And really, there were about four other books up until 1935, and then there's been this massive explosion of interest in sleep. But we really know very little about sleep. We know that animals do it. We know that we do it. We know we have to do it. We don't know why we have to do it.

- Well, I was hoping we'd start there, with what are the neurological, psychological processes that go behind it. Why do we need it. And what the hell is happening when we're doing it.

- If I could answer you that, I wouldn't be sitting here, I'd be polishing my Nobel Prize because we really don't know. And what happens, if you follow the literature, there is a new paper every couple of months saying we've found this gene, we've found this neuro-transmitter, and all that's happening is that the picture is becoming more complex, not clearer. We really are going down avenues that we're unaware of. Everybody knew, for a long time, that we responded to light dark. You know the sun comes up, and that's the sign get up, wake up. It goes dark at night, go to sleep. So we all thought that the brain responded to light dark, via the suprachiasmatic nuclei that is the switch that says right release melatonin, which is the thing that sets that cascade of events that allows us to sleep. We now know, that there is another, at least one other clock, that is food related. So those animals that live on the very edge of existence those little sort of shrews that have to eat their entire body weight each day to survive, they actually can forgo sleep, if they are in a starvation situation. Because food is more important to them, than sleep. So the idea that we have to sleep, is slightly then modified. And we now know also that food plays a role in setting the human clock. There is actually a clock in the stomach, and this is why the regularity of meals, and also eating meals at the correct time if you're in a jet lag situation, is important, as well as the light dark.

- But they say the milit arian response is a trigger for sleep.

- Yes.

- That definitely does have an effect.

- Yes. It's called dim light melatonin onset. So when it goes dark, you get this massive release of melatonin, and that melatonin then dissipates across the night so when you wake up in the morning, you have no melatonin. And this is the big problem that we have in our society now is that in the past, you had either sunlight or night, and then you either sat around the fire, or you had candles. Now both fire and candles are very orangy yellow, whereas now we've replaced orange and yellow with blue. And we know from Russell Foster's work from the early '90s, that there is a fourth receptor in the eye that responds specifically to 460 to 480 nanometers which is blue. So everybody watching this video now, with our lovely blue background, will stay awake. You are suppressing the melatonin. All the time you're looking at a blue screen be it a tablet a smart phone, or your computer or your TV, these things fluoresce blue. So we are suppressing our melatonin. So the new advice about avoiding screens is because of this blue light is suppressing the melatonin so only after you turn off the screen, do you get that melatonin release. So if you're in bed, looking at your smart phone, you turn that off, it's going to be about 20 or so minutes before you get the natural release of melatonin. So we know that people who use screens take longer to fall asleep and have worse sleep, and feel sleepier the next day because of it.

- Does that mean that in the research behind the creation of screens they're trying to overcome that or do they regard that as a positive?

- Well, there's a lot of work on light and wavelengths of light as to what is good because now people like Apple and that have released these night modes which strip out the blue light. The problem is if you strip out the blue light, your screen actually goes really quite dull. And so people then turn up the brightness. And actually bright light starts to have the same sort of problems as blue light. So there is an awful lot of research, big companies are doing a lot of research on the correct light, at the correct time. Because blue light is great for waking you up in the morning. This is why the first thing you should do in the morning is throw the curtains open. Because even on the dullest British autumnal day, there will be a lot of blueness in the light in the morning. That's the signal. It takes only four minutes of daylight, to tell you it's day time. So you only need a very small amount of exposure to the sun to wake up. So blue light's great for waking you up, it's great for stopping you getting seasonal affective disorder, but it has no place in the bedroom.

- It's great in the workplace. I get my team working longer hours if I've got blue lighting.

- Absolutely. And the other great use of blue light, is in nursing homes with patients with dementia. Because they, you can then reduce their aggression and their sun downing by using daylight simulating bulbs which are essentially more blue, rather than the sodium and strip lights.

- Sun downing.

- Sun downing, the aggression and the disorientation they get before bed in demented patients, which is a real problem and so on for carers, as well as in nursing homes. So blue light can be very, very positive, but it can also say have that negative connotation.

- So what, if I can just go back to the, you know you did a lot of research, you were involved with research with the Royal Air force and it comes as no surprise to a Royal Marine you always assume that the RAF were asleep anyway. But you then went on and you set up and ran a very large sleep research unit, with the University of Surrey. What research were you doing? What were you specifically looking at?

- Well the human psychopharmacology research unit, the HPIU was a unit set up by Professor Hindmarsh in the 1970s and what it was looking at was the effects of medication on the brain. So, everybody knows if a drug has a problem, has problems with your liver it's hepatotoxic. Professor Hindmarsh came up with this idea of behavioral toxicity. So you can take a medication for an illness, but it will have side effects on things like memory, reaction time, cognitive function, and sleep. So an unintended effect. So Professor Hindmarsh developed a test battery for measuring cognitive function, but of course you need to look at the effects 24 hours. So the unit that I set up which is a 24 bed unit, was looking at the effects of medication on sleep. Not necessarily sleeping tablets, although we were instrumental in developing a number of sleeping tablets, but any drug that crosses the blood brain barrier, will have an effect on sleep, either positive or negative. But of course, it used to be, you know, you developed an anti-depressant, if it reduces the depression call

it an anti-depressant. Well, you know, on that basis, all anti-depressants are equal. But there are vastly different effects of anti-depressants on sleep, which may then of course, have an effect on the depression. Because if you've got insomnia because of depression, and you're given a drug like an SSRI, selective serotonin reuptake inhibitor, and that also causes insomnia, then you know, you may reduce the depressive mood, but you've induced insomnia. And insomnia is the biggest cause of relapse in a depressed patient. So you know, there are differences. There's horses for courses in a way, with regards to medication. Not all medications are equal. If you just judge them on their therapeutic effect, yes. But on their side effects, their behavioral toxicity, then there are major differences which need to be taken into account if you're prescribing medication.

- I mean it sounds a bit cynical of me, but it is a serious point, that what you've just mentioned would seem to be an advantage if you're selling SSRIs that the drug itself actually causes more depression so you'll sell more SSRIs.

- I mean, the idea that big pharma is a cynical organization cartel of companies, they do want to do the right thing. The problem is that say the regulatory requirements for drugs do not serve the patients very, very well. They're not, clinical trials do not really mirror what people would ordinarily do. I mean we did the first ever study of the side effects of anti-depressants for six months' duration, because the prescribing regime for anti-depressants is for six months. So people used to do a one week study and say well drug X it had a sedative side effects for a week, but after two weeks they probably disappeared. But they never measured after two weeks, they just hypothesized. And so if you do a six month study and you find out this drug causes sedation every day for six months, that's a very real life thing. And clinical trials just didn't really allow drugs to be As I say, anti-depressants, if they reduced the Hamilton rating scale by 50%, they're an anti-depressant. That's it, that was--

- Tell me about the Hamilton rating scale.

- Max Hamilton came up with a rating scale for depression, and it's the benchmark against which all anti-depressants are measured. So if an anti-depressant reduces the Hamilton by 50%, it is an anti-depressant, regardless of whatever else it does. It's a hypnotic, a sleeping tablet, as long as it gets you to sleep quicker than a

placebo it's a hypnotic. Well does it do anything about middle of the night insomnia, waking up early. Does it do--

- Or does it actually fix the health problem that--

- Exactly. So the end points were very arbitrary endpoints, and so medications are perfectly effective, and SSRI is as good as any other anti-depressant, if all you want to do is reduce depression. But you need to look at these things wholistically. It's like pain. Pain medication's very, very effective. But they have massively different effects on sleep. And the worse you sleep, the more pain you feel.

- This is really useful stuff for us, because as you know most of our viewers, most people will see the recording of this as well, they're going to be physical therapists. So we're going to be seeing an awful lot of people coming to us who have been prescribed pain medication or are on over the counter medical preparations, and it would be really nice to know, what we might expect to see in the patient as a result of them taking those medications.

- Well--

- Which are the worst offenders.

- For sleep, the worst offenders are opioids. Opioids are terrible drugs to sleep. They basically wipe out the deep restorative part of sleep.

- So the patient will sleep?

- They will sleep, but thy will not have deep sleep. And there was some work from France that actually shows that deep sleep, in itself, is actually analgesic. So if you reduce deep sleep, you will feel more pain the next day. And if you increase deep sleep, you will feel less pain.

- Very useful.

- So even just manipulating deep sleep, without giving any pain medication, would be beneficial to your patients. Now most pain medication actually reduces deep sleep to a degree. And as I mentioned SSRIs which are sometimes used in pain they actually cause insomnia anyway, so they're going to be problematic. There are a couple of medications that are licensed for neuropathic pain, specifically. Which from research that I actually did myself, we know actually increased slow wave sleep in a selective way. That's Pregabalin and Gabapentin, but as I say their license is only for neuropathic pain. They're not licensed for sleep. They're not hypnotics, but the problem is, in something like amitriptyline, given widely for pain, has no published efficacy on sleep. It causes day time sedation, but it has no published efficacy on sleep. And so somebody if you reduce their pain, of course they'll sleep better. But does that mean they're sleeping best, and we don't really have a way of , if a patient comes to you and say oh, whatever you did to me, I'm sleeping better. But that could be a marginal improvement, or a massive improvement. We have no way of knowing which one works.

- I feel I need to wind you back a little bit here because you've talked about deep sleep, and then you've talked about slow wave sleep, I think you mentioned earlier on. So maybe I should go back to where we began this conversation, let's have a bit of the background of the science of sleep. We don't know why you need to sleep, but you do, I imagine, know what goes on during sleep.

- So what happens, during the night there are two distinct states of being. There's non-rapid eye movement sleep, and then there's rapid eye movement sleep. And they are as different from each other as they are from awake. You don't notice the transition between the two states because hopefully you're asleep.

- Now am I right in thinking these go in cycles?

- These goes in a 90 minute cycle. So within 15 to 20 minutes of you switching the light off, you should be asleep. A healthy adult should fall asleep within 15 to 20

minutes. Regularly taking more than 30 minutes to fall asleep is probably indicative of insomnia, but also, falling asleep too fast is a problem. Because if you're falling asleep in less than five minutes, you're probably really sleep deprived. So boasting that you fall asleep the minute your head hits the pillow, is not a good thing.

- Always not a good thing, or--

- Always not a good thing. You know okay, you can have a late night and then be sleepy the next night, but if you do it that consistently--

-surprises me. And I think it will surprise a lot of people.

- Yeah well, again we concentrate on the negative of sleep, but we actually know that long sleep is just as bad for health as short sleep, and yet nobody talks about sleeping too much. So as I say, 15 to 20 minutes you then go into sleep. You quickly go through the lighter stages of sleep. Stage one which is the transition between sleep and awake. So every time you go to sleep, you'll go through stage one sleep. It's the lightest stage sleep, and if I were to wake you up during stage one sleep, you'd actually say why did you do that, I wasn't actually asleep. And this leads to what we call sleep state misperception. So, where you say oh I had a terrible night, I didn't sleep at all, and the Mrs says, well, you were snoring all the way through it. So you are asleep but you're unaware that you are asleep. You don't believe that you are asleep. That makes up about one to five percent of the night. You then go into stage two sleep, which actually, over the night, makes up 50% of the night. And so we spend 50% of the night in stage two sleep, so you'd think it was important. However, we really aren't certain what it does. It seems to just be there to keep us in bed for the right amount of time, and I'll come back to that statement in a minute.

- How's it characterized? What is stage two sleep?

- Stage two sleep is just true sleep. Your brain is quiet, it's not attending to its environment, and it's differentiated by a couple of little wave forms, one thing's called a

sleep spindles which is a burst of activity and a kay complex, which is a large depolarization that we don't actually know what these things are there for. We don't know what they do. People have spent years counting them looking for patterns, and have come up, they've drawn a complete blank as to what is happening.

- But from what you said earlier on, you have non-rapid eye movement sleep and rapid eye-movement sleep, so this must fall into one of those categories.

- This is non-rapid eye movement sleep. So you have stage one, stage two, and then you have stage three, which in the past was stages three and four, but they've been consolidated. And this is deep, slow wave sleep. Slow wave sleep makes up 25% of the night. Slow wave sleep is the bit of sleep that makes you think like you've had a good night's sleep. So it's the restful recuperative part of sleep. And slow wave sleep is vital for four reasons. Memory, forgetting, learning and growth. So deep sleep is the most important part of sleep.

- How can we know this?

- How do we know this? Because you can do various different studies, I mean we know that you only grow during deep sleep. This is some research that the Italians did using lambs. And of course it makes sense that you only grow when you lie down, because if you didn't you'd be pushing against gravity and that would be incredibly inefficient and also if you were moving, that would be incredibly inefficient. So we know that about deep sleep. We can actually deprive people of deep sleep, to a greater or lesser extent, using noise to do that. And we know that that then affects memories and the acquisition of knowledge. So we know that deep sleep is where you do the filing of the day. You gain all this information during the day, but only at night do you file that away so that you can retrieve it. So if you don't have deep sleep, you won't lay down that information of the day, and you won't be able to remember it. And we also know that you learn. So if you practice a task before you go to bed, until you're as good at that task as you can be, get a good night's sleep, you'll be up to 17% better at that task simply by getting a good night sleep. And that's done using a maze, and you learn a maze. You go through the maze, and then you actually rehearse that. So deep sleep is the really important part--

- So doing that, in what you've just described, if you're learning about the trumpet for example, you would do that immediately before you went to sleep.

- Yes, absolutely. The brain will deal with the thing that you need to, the most important thing you do. This is why--

- But you do it immediately before bed.

- Immediately before bed.

- My wife's going to hate you because I'm going to learn the trumpet.

- Well that, but this is why if you're trying to pass an exam, staying awake all night cramming is pointless. Because you gain all the information, but you don't file it away so you can't retrieve it when you sit down in the exam. So if you want to pass an exam, read what you need to remember three times just before you go to bed, the brain will know that's important, file it away, and then you'll be able to retrieve it.

- To most people like me though they need to read the whole of the learning from the last year before they go to bed, so it's not easy to do that three times before you go to sleep.

- Well, the problem--

- That's why we're up all night.

- The problem with slow wave sleep is, it diminishes with age.

- Right.

- And there's a sex difference in this, or gender difference to this. Men start losing their slow wave sleep a lot earlier than women. Men start losing it from around the age of 35, women from around the age of 55 which is genuinely why men's memories become worse as we get older. And it's also why men sleep worse as we get older. A man over the age of 60, sleeps worse than the average woman over the age of 60 because we've been declining much longer. So, after about 40 minutes after switching the light off, you will be in deep sleep. You'll have a consolidated period of deep sleep, and then after about 70 to 120 minutes, you'll have your first dreaming period. Your first REM period. Now that may only last five minutes long. You'll then go back into some more deep sleep, and then on a 90 minute rhythm, you'll have your REM periods. Now, your slow wave sleep, your deep sleep, is in the first third of the night. So in the first two sleep cycles, you have deep sleep and as an adult, in the latter part of the night, your sleep is either in REM, dreaming sleep, or in stage two. And as I said, stage two, as I said earlier, we don't know why we do it, but it would seem that we need to have four or five REM cycles, each night. And after we've got our deep sleep, there really is very little point in staying around sleeping. So stage two seems to be there, as filler, to keep us in bed, why we then need our REM periods on a nightly cycle. Now that's the big puzzle of sleep. Why we need sleep cycles. You would have thought after a million years of evolution, we'd go to sleep, we'd have our deep sleep, we'd have one long period of REM and then we'd wake up. That would seem to be the vastly most effective way of doing sleep. And it hasn't.

- It's always worth thinking though, evolution doesn't work that way does it? Evolution favors those who can breed. It doesn't matter how well you can sleep, as long as you can breed.

- Well, yeah.

- Most of us have little trouble doing that.

- But again, there seems to be a reason for this structure that we just do not understand. And actually this 90 minute cycle, actually happens during the day as well. If you were to be completely devoid of stimulation, you would day dream every 90 minutes. You would gaze out the window and daydream. So it's still there. But why? We know that during REM sleep you're dealing with emotional factors. So deep sleep is about factual memories, what happened. REM sleep is about the emotional aspects of that memory. So you need to combine the two, and that's why you have REM after deep sleep. But why that has persisted, and I say why, and that's the great mystery of sleep. That after a million years, this is the answer. Which means the question's a bit stupid to be honest. But we know that all mammals certainly dream. We have no idea whether birds and insects dream. We know they need sleep, but we have no idea what they dream about, if indeed they do dream.

- Right, I'm going to pause your talk there, because I need to add some questions. They're coming in as they always do, on my little thing here. Somebody's asked why they always fall asleep in front of the telly, if the blue light from the telly is meant to keep them awake?

- Ahh, this goes then back very much before tellies were invented, to evolution. Essentially you can only fall asleep when you feel safe and secure. If there's a threat in the environment, you cannot sleep, because it's survival, as you say. And so you have to feel safe and secure. Now, for a man, an evolutionary role is to hunt and to protect. And so as long as he has hunted and has locked the front door, that's his job done. And the default state for an animal that has met all its biological needs, if you've had food, had sex, there's nothing else to stay awake for, so you might as well fall asleep. So, if he's, I presume it's a man, it almost certainly is. If he's safe and secure enough to be sat down enjoying the football, he's safe and secure enough to fall asleep.

- I suppose the other question is, well if he hadn't had the telly on, how much longer, or how much shorter would the time have been, before he fell asleep.

- Yeah absolutely. And you know, the difference again, this is another gender difference, women rarely fall asleep in front of the telly, because women's role is much more broader. They worry about will he still love me tomorrow, have the kids got food, have the kids got clean clothes, et cetera, et cetera. So women are much more active, whereas men can switch off a lot more easily.

- I have to ask if there's serious research behind that?

- There is absolutely serious, biological research--

- Good, I'm glad to hear it.

- There is really, women find it much, much more difficult to switch off, whereas men as I say, once we've met our simple biological needs, that's it. We've done our job. We need sleep. And there is even some research produced by good friends of mine at the Sociology department at the University of Surrey that show that women actually subconsciously sacrifice their sleep for men. So a woman will rarely wake a man up who is snoring. Because she believes he's worked hard, and he's the bread winner. Whereas men have no hesitation in waking a woman up who is snoring.

- Doesn't stop her stealing the duvet though does it?

- Well they do that unconsciously. But again that's nesting.

- We've got some more here. You mentioned seasonal effective disorder earlier on, and someone's asked whether the seasonally affected disorder lights work. Now I've never come across one, but--

- Yeah I mean, these are bright lights. If you're going to use lights for seasonal effective disorder, or if you have circadian rhythm problems, so if you're one of these people who go to bed at two o'clock in the morning and can't get out of bed until 10 o'clock in the morning, 10,000 lux blue light is very effective. I mean they used to be white light, but then once with Russell Foster's work, we realized that blue light was key. Powerful blue light in the morning for 30 minutes really, really helps the seasonal affective disorder and the circadian rhythm disorders.

- Okay, we've got a question from Monica, this is the lady who likes to set fire to her instructors on first aid courses. She said she's done some research recently on Alzheimer's, dementia and cognitive function in general and one of the things that came up time and again was that sufferers who died from Alzheimer's were often insomnia sufferers for many years of their life and regular lack of sleep would effect everyone's cognitive function. What's your view on that? Thank you Monica.

- I mean there is a very strong association between insomnia and increased risk in Alzheimer's. People with severe insomnia are three times increased risk of developing Alzheimer's.

- How do you define insomnia then? What's severe?

- A medical definition of insomnia is on the majority of nights, taking more than 30 minutes to fall asleep, or only being asleep for less than 85% of the night, and key is having day time consequences. If you've got a problem with your sleep, you should have day time consequences. So if you feel alert, happy, awake, focused during the day, it doesn't matter how much sleep you've got, you're doing the right thing. But if you feel sleepy during the day, then that's indicative that there's a problem with your sleep. And insomnia needs to last for at least three months, let's say the majority of the nights over three months if you've got insomnia. But as I say there's a strong link between insomnia and cognitive function, and also Alzheimer's. There is a suggestion that deep sleep plays a role in this because remember I said it was about laying down memories, and of course a patient with dementia or Alzheimer's has got perfectly good recall of their childhood, and their early adulthood, but it's the laying down of that new memory. Which is purely a function of sleep. And so there would seem to be a very strong link between that. But yeah, there's no good thing about bad sleep. Which is why sleep is so important.

- But it is regarded as such a massive thing, I think that you mentioned earlier on. I think people, I think you mentioned in talks before, that people always say well Margaret Thatcher survived on four hours, Winston Churchill survived on cat naps, and a lot of that is marketing nonsense.

- It is propaganda. It's absolute propaganda. There is this virtuousness that I don't sleep, therefore I am better than you. And in the past for the previous 1400 years, that was really based around Christian view of sleep, that if you were asleep you were not praising God, and the night was the time of the Devil. So you actually wanted not to encounter the devil and you wanted to praise God and the more you praised God, the happier God would be. So, the early Christian fathers, right through people like Hornick in the 16th century were saying get up to midnight prayers, get up early, early rising. Charles Wesley talked about early rising and getting up to praise God. So that was it, I'm more holy than you because I'm praising God more often than you. And then there was this sudden switch to I'm better than you, so Napoleon, it was he was great because he didn't need sleep. He needed as much, he needed seven hours sleep. I've got good evidence he did. Edison was a tireless worker who fell asleep at his bench. Well actually he was actually a napper, and again, there's a letter from his daughter saying that he finds it so hard to meet the expectations of the newspapers. He actually came home, had his tea at six, went to bed at nine o'clock exhausted. But it was this mythical I'm better than you, it's macho, and Thatcher she was just competing with the boys. She didn't want to be seen as weak. And it's just an absolute nonsense, but it became more pervasive.

- So did she actually survive on four hours, or was it just propaganda?

- Charles Moore when he wrote the first volume of her biography actually said that there was no evidence that she slept for just four hours. There are nights where she's described as staying up until 2 o'clock, some of those nights she was working on her red boxes, other nights she was enjoying herself. Well yeah you can look at anybody's life and find out nights like that. But there is no evidence at all, that she only needed four hours of sleep on a regular basis. And it's just this mythologizing, but of course that had a terrible effect on our relationship with sleep, because you know, one of the questions I always get asked is how can I get less sleep? Which is a very strange question because you would never ask, somebody would never ask you how can I eat more unhealthily, or how can I do less exercise? That would be a stupid question, but with sleep it seems people believe that's a valid question to ask.

- There are some notable exceptions, great historical figures who didn't need a lot of sleep I believe.

- Oh Adolf Hitler is a very famous short sleeper who's well documented, so if you're looking for a role model for short sleeping, he is probably the best characterized person as a short sleeper, so that would claim that short sleep is not necessarily a positive thing to do.

- Well I guess this just reinforces there's no one rule for anything is there? It's all individual.

- Sleep need is like height. It's genetically determined and we're all individuals.

- Does it change?

- Once you get into your early 20s, it doesn't. Your sleep need remains fixed for life, so an eighty year old needs the same amount of sleep they needed when they were 25. What changes is that loss of slow wave sleep as I mentioned earlier. So sleep as we get older becomes less refreshing, and is also more easily disturbed. And of course the problem is that when we get older, there are more things to disturb our sleep. And so getting up to go to the bathroom, is not a problem. Staying awake for an hour and a half because we got up to go to the bathroom, because there's very little pressure for us to go back to sleep, once we've woken up, because we don't have that need for sleep that a child or a teenager does. So our sleep need remains constant anywhere between three and eleven hours can be considered normal. Eight hours is merely an average, it's not an ideal. So a four hour a night person needs to get four hours. It shouldn't be too difficult. An eleven hour person needs to get eleven hours to feel at their best. And this is the key thing about it is getting the right amount of sleep for you. Whatever that is. And that's very simply the amount that allows you to feel awake during the day. So if you feel awake during the day, you've had enough sleep. However you've done it, wherever you did it, whoever you did it with, how often you did it, if you feel awake during the day you've had enough sleep. It's as simple as that.

- Yeah, I suspect we're going to come back to that but I've got a whole heap, I've got a mass of questions which I need to ask or people are going to get cross. Are Paperwhite Kindles, are they okay to read in bed?

- No This was a study, everybody would say, the blue light they thought Paperwhite Kindles they'll be fine, but no there is a study that shows that they're just as bad because now again, this is where the science of light is not just blue light bad, every other light good. The brightness of a Paperwhite is actually equally as bad as bright white light is as bad as dull blue light.

- And what about sleep monitors on phones and watches are they useful.

- They're a complete waste of time, effort and money. Basically they're highly inaccurate.

- What are they designed to tell you?

- Well this is the problem. They're based on the concept of actigraphy. Actigraphy is the use of a wrist worn monitor that measures movement. And actually my PhD was on Actigraphy. I was one of the largest users in the world, and I know the technique intimately. And essentially, very very simply, if you're not moving, you're asleep. And if you are moving, you're awake. That's really the threshold. Now, they're slightly more sophisticated than that, but not an awful lot more than that. So basically--

- We all turn over in our sleep.

- Exactly, or you wake up and you don't move. I mean the only way to measure sleep is by measuring the brain. Because you're measuring the brainwaves. So these are an approximation. They're, at best, 30, 35% accurate, and that's for sleep wake. They cannot tell you anything about deep sleep or dreaming sleep, it's impossible for these techniques to be able to measure this. So these scores that they give, the percentage amount of sleep, deep sleep or REM sleep are highly inaccurate, and if all you're going to do with it is have a joke with your mates down the pub, fine. But if you take the information seriously, you're going to run into massive problems. So if you look at it and you go, oh I slept

really well last night I can drive to Glasgow, you are really in trouble, because it is highly inaccurate.

- Is there any value in one of those devices if it shows a change in your type of sleep?

- Over long term, patterns may be. But again, very, very simple information about the patterns. Is there a shift in the time, but duration and wake really they're so inaccurate that it's not really going to give you any useful information.

- Matthew Davis is one of our regular questioners and Matthew has asked whether hypnotics are ever useful over all, under any circumstances?

- I'm perhaps in a minority in believing that if you have a problem, with any illness and there is a drug that is shown to be effective in treating that illness, then that drug has a role. Now, you can say that sleeping tablets cause addiction although there's very little real hard evidence of that. They cause falls in the elderly, but there again so do insomnia, and so do SSRIs. If you're worried about falls, there are plenty of drugs you should avoid. Tolerance. Again there's little evidence. There's a study with Zolpidem for eight months showing that there was no tolerance with it. If you have pain--

- Sorry, no tolerance, meaning?

- No tolerance meaning you don't have to up the dose to get the same effect. Now with something like pain, if you have got pain, neuropathic pain, you are treated with a drug to effectively reduce pain.

- I see somebody's asked us about Gabapentin because they thought it was anti-epileptic drug--

- It is. Gabapentin is licensed for neuropathic pain as is Pregabalin. So you can be treated. Opioids as I say are horrible drugs. And yet people are on these for life because it reduces pain. Now if you were to stop an opioid and you're still in pain, you wouldn't call that rebound pain. That would be a stupid concept. But if you've got insomnia, and you treat that with a hypnotic and you stop the hypnotic, and you've got insomnia, that's rebound insomnia. And that's somehow a negative thing. So there are some people who have got idiopathic insomnia. Insomnia for no other reason. If a sleeping tablet helps them sleep, they should be given that drug for as long as they need that drug, because whenever you compare a drug, you compare it to giving nothing. You don't compare an insomniac with a treated insomniac.

- I thought nowadays you always compared drugs with the current best alternative.

- Now you do, but when all the hypnotics were developed the last new hipwas 15 years ago. So the thing is, I would get in, I would happily get in a car with somebody who was well treated and well stabilized on a hypnotic, than somebody who's an untreated insomniac. Hypnotics aren't great, and they have many down sides, but every single drug on the planet has a down side. So it has to be a cost benefit judgment. So some people should be on sleeping tablets. The vast majority of people who are on sleeping tablets actually don't have a problem. They just want a quick fix because they're too lazy to improve their life in a meaningful way to help them get a good night's sleep. They just want to short change the system.

- They clearly benefit from those in some way and yet earlier on you said it is not improving the quality of their sleep it just means that they're out cold for eight hours or whatever.

- Sleeping tablets stop you waking up. That's all they do. They don't improve the quality of the sleep, but because you're not waking up, they allow whatever sleep you can get to happen.

- Okay.

- As if that makes any sense. So--

- So it is better than not having any sleep.

- Yeah, exactly. And because as I say, if you're waking up every hour and staying awake for an hour and a half, and a hypnotic can stop that, then you might not have the best night's sleep, but you're having an awful lot more sleep than if you didn't wake up, than if you did wake up.

- I'm going to go back to some of these questions. I want to carry on with what you were saying earlier on, but let's have a. Matthew Davis again, so is there any effect of blue light on blind people? How are their sleep cycles regulated anyway? Is there any difference from sighted people?

- Blind people, if they are totally blind, have no response to light, what works for them is melatonin. Taking melatonin induces a rhythm in them perfectly.

- Artificially taking--

- Artificially taking melatonin. They're about the only people, blind people and autistic children are about the only people who should be taking melatonin. But no, if they have no light perception then blue light will have no effect.

- So what happens to their sleep rhythms if they have no light perception?

- They just, they just drift. They sleep whenever they want to. They have, as I say that light dark is the major control and if they don't and judicially timed melatonin can perfectly induce rhythmic in blind people.

- We've got a good question here which comes back to something you said earlier on, that also reflects that 90 minute's cycle that you talked about in sleep. Because this person has asked, and I have no idea who you are, I'm sorry. What's the down side in falling asleep in less than a minute and does that mean that power naps during the day are a bad thing? And they say they hope not, but I suspect you're going to say that--

- Well no, power naps during the day are a good thing if you need them. The question is, why do you need them? If you were sleeping well at night, you wouldn't need a power nap. However, if you are sleepy during the day, the thing that you need to do is to recharge your batteries, and a power nap is the thing to do.

- Does your power nap not have to be 90 minutes then--

- No. Well it can be, but the thing with the power nap is it should be 20 minutes long. Because 20 minutes means you shouldn't go into deep sleep. Because if you wake up during deep sleep, and we've all done that, you wake up during deep sleep you feel like you've been hit by a bus. You feel much, much worse, than you did before you went to nap. So a 20 minute nap should mean you don't go into deep sleep. So if you're going to sleep for more than 20 minutes, then it should be two hours. Two hours will hopefully miss completely the first wedge of deep sleep and hopefully you'll wake up in the REM sleep. But a 20 minute nap actually means it's going to take 40 minutes or so in total, to get a 20 minute nap because it should take you a finite time to fall asleep. If you are falling asleep within one minute, and having a 20 minute nap, you really are sleep deprived and that 20 minute nap is probably not going to do an awful lot for you. But a nap, if you're sleepy, the nap is the remedy. Drinking coffee, is not a remedy for feeling sleepy. Because coffee is a very bad caffeine delivery system. You don't know how much caffeine any one cup of coffee has got in, which is why the advice if you want the ultimate power nap, is to drink two cans of a functional energy drink, or as everybody would know it, Red Bull, before the nap. Because caffeine takes 30 minutes to kick in, so you get the benefit of the nap, and you wake up and you get the kick from the drink. And the reason for saying a functional energy drink is just you know it's got a controlled amount of caffeine in it. Whereas a cup of coffee can vary from zero to a very large amount of coffee, caffeine. You can't taste it, you don't know. It's got nothing to do with brand, it's got purely how to brew it. So drinking two strong black cups of coffee may absolutely make no difference at all.

- There's a question here which says that you listed four things which are reasons why we sleep earlier on, which was memory, learning, so this person said. You said you don't know why we sleep. Actually I think what you said is we don't know--

- We don't know why we sleep in that way that we sleep. Why we have to have deep sleep, REM sleep, deep sleep, stage two sleep, you know another three REM periods. We don't know what that is doing. We know that we sleep. Sleep is for the brain. The only bit of the body that must have sleep is the brain. So all the idea about it's saving energy and repair and recuperation we're doing that all the time. The brain needs to do its housekeeping. It does that at night. But why we sleep in that way, and why some animals sleep a lot with much smaller brains have much more sleep, et cetera, et cetera, really isn't the thing that we know.

- Okay. Claire Arnold has said women don't get the chance to sit down and watch the bloody telly, these are her words. Watching this whilst cooking tea and cleaning the kitchen--

- Absolutely. That perfectly proves my point.

- And someone else says my children are my sleep problem. Well they're self-inflicted injury if you ask me. How does infant's sleep differ from adult's we're asked?

- Children need a lot of sleep. Because they need an awful lot of deep sleep because memory, learn and growth as we mentioned. Every important thing about the development of a child occurs during the night. The most important thing that you can give a child is sleep. So, they have much, much more deep sleep and they have more REM sleep. Because of course, they are, everything that happens to an infant is new. And it has to make those connections. What happened, and do I like it? And do I want it to happen again? So all of these connections need to be made. So children need a lot of sleep. So a new born needs 16 to 20 hours sleep. A 10 year old needs approximately 10 hours sleep. Which is an awful lot more than they actually get. I mean this study a few years ago showed that 26% of three year olds have a TV in their bedroom. So you know, it is a real, real problem, and so the most important

thing an adult can do for a child is to make sure the child gets the sleep it needs. So until the child is six, they should be having at least one long daytime nap, and again in the past at infant school, people did nap. Children did have an afternoon nap. And that's again, gone away completely.

- Yes, dare I say it, this is really useful stuff to hear this based on research because it's all very well us reading in the press, or generally feeling that screens are bad for people, but there is this increasing habit of shoving children in front of screens day and night, and including now you're explaining the down side of that. Somebody here, it would be nice if you give us your names, because it helps me sort of put some flavor and some color onto the questions, but this person would like to know if you have any tips on sleep hygiene to give our patients.

- Okay, well I mean sleep hygiene is a term that actually has quite a long history. It was first used way back in the 1890s, but as we all know sleep hygiene these days it came about in the late '70s--

- Is this the clean sleep context--

- Well it's now called clean sleep. There's plenty of names for it, and it's essentially the ten top tips for sleep. Well the first edition of the booklet that was published and had 10 top tips and then the second edition a couple of years later had an 11th tip which was don't smoke. That was, at the time, the change against smoking. But essentially it's that avoid TV, keep the bedroom for sleep and sex, noise is bad for sleep et cetera, et cetera. Cut down on caffeine. And these rules have been endlessly repeated, modified--

- Were they based on science then?

- They were, but they were based on, I can't even say they were based on science. They were based on common sense, backed up with science. But you know--

- Sorry, I'm interrupting again, but haven't you said elsewhere that actually this thing about cutting out caffeine is nonsense? Because plenty of us are not susceptible to caffeine in that way. This is the problem with sleep hygiene. It's 10 rules that there is no arguments. There's no grayness. It's either black or white. So you know now, and what's happened is say they were written originally by Peter Howie in a very gentle suggestive way. But they've now become almost puritanical. I mean I was reading a review or an interview with Matt Walker who's just published his new book called Why we Sleep and he said no alcohol at all. Don't go to bed tipsy. Well that's puritanism. That's not science. Of course if you're --

- But he is regarded, a well regarded scientist.

- He is a well regarded scientist, but when you start writing popular information for the public, it becomes puritan-- Don't drink caffeine after one o'clock. Well there's no evidence for that., you know the time one o'clock. It could easily be two o'clock, it could equally be 12 o'clock. It could actually be keep drinking, if you've drunk two strong black cups of coffee every night for the last 40 years, and you've suddenly got a sleep problem, I guarantee you that cutting that coffee out will make not the shred of difference. And this is what we're lacking. We're lacking that common sense, individually advice. I did a university of the third age lecture a couple of years ago and this 94 year old woman came up to me and she said what's the problem with alcohol and sleep? I said why do you ask that and she said well I used to have a small sherry before bed, but my doctor told me to avoid it because alcohol has an effect on sleep. She said I do so miss it. And I said, you genuinely, he genuinely believed that a small sherry, which is a perfect way of ending a night, is going to suddenly mess up your sleep. Now I say if you drinking half a bottle of value scotch before bed, then it might be a problem with your sleep. But you've got to be reasonable. You've got to listen to your body. If you're very sensitive to caffeine, avoid caffeine. If you can't stomach a vindaloo, then don't eat a vindaloo. Going back to the sleep hygiene there's the advice, don't eat spicy food. Well that means that at least 5 billion of the world's population must have bad sleep because their food is spicier than the western diet. Well it can't mean avoid spicy food. It means avoid food that's going to upset your stomach. We're giving these rules as though they are simply black and white and they're backed up with science, and they're not, because we are all individuals.

- And this is an unfair thing to ask. Are you able to trot out the eleven so-called points?

- I couldn't--

- Smoking, alcohol, caffeine?

- Smoking, alcohol, caffeine, noise, dark, avoiding screens, keeping the bedroom for sleep and sex,--

- But we could Google these and find them--

- Yeah, yeah. I mean just, no, no. And strong association between sleep and the bed, and regular wake-up time.

- Okay. What about our alarm clocks though? Because I mean most people now have got a digital or radio alarm clock with bright red led. So red leds are okay aren't they?

- They're okay, yep.

- So we don't have to black them out.

- No we don't. But of course there is the advice that if you wake up and you look at the clock, and you can see the clock, then you start doing the computation. Oh it's three o'clock in the morning, I have to get up at seven, that means I've got four hours to go to sleep and oh my God I haven't fallen asleep and it's another 20 minutes on, I'm never going to get to sleep. So you start having that anxiety if you look at the clock. So there is the idea that you should turn your clock around so you don't know what time it is. And actually, most people don't have an alarm clock any more, children have their phones. They rely on their phones as their alarm and of course that puts the phone right

next to their bed. 26% of teenagers are regularly woken up after they've gone to sleep, by their phones either by messaging or exactly. And of course, if you think about it, certainly when I was growing up, nobody rang the house after nine o'clock. If somebody rang the house after nine o'clock it meant your granny was dead.

- Yes.

- Now children don't have those same temporal thing. They don't respect time. And so they do think it's a valid thing to text or message in the middle of the night. And that's the big problem of having the phone as the alarm clock in the bed.

- Talking about sleep disorders in children, again I don't know who's asked this question. Is there a particular nutritional deficiency or disfunction that can be assisted therapeutically and how? One child can sleep on in the morning, lethargic, night sweats and snoring. Another a light sleeper awakes frequently, fidgets all day, and has short concentration spans. Suggested that that may be ASD, but not fully assessed or diagnosed. Does that ring any bells, does that make sense?

- Yeah the problem is, this again is where we've got ourselves into a bit of a tizzy. In the past children didn't have sleep problems, because children are children. It was accepted that children were a bit weird. It's a stage they're going through, they grow up, they become adults, you get rid of them, that's good. Now, we've been made to be so anxious about children's sleep. I mean there's a so called sleep expert on the web and she became a sleep expert because after two weeks, after birth her child wasn't sleeping. Two weeks. The child has no idea, it's two weeks old. It has no idea what it's meant to do. It's a developmental process, so parents have been caused this huge anxiety about their children. Now two children, even though there might be just nine months between them, there is no guarantee that they're in any way similar. Now just because one child does one thing and another child does another thing, doesn't mean that one's doing the right thing.

- So this questioner shouldn't be worried about that?

- Again, when I said about an adult that if you feel awake, alert, focused during the day, you've had enough sleep. With a child, you as a parent, need to judge it, not by what it does at night, but by the way it is during the day. So if your child is well-behaved, focused doing well at school, thriving, to use an excellent word, if your child is thriving then don't worry about it sleep. Because for a child a small period of time it's brains developing, their sleep pattern will change. If your child is aggressive, running into walls, biting other kids, putting on a massive amount of weight more than it should be, snacking having behavioral problems then maybe something that you need to do with regard to their sleep. And you know, put them to bed early enough. Read them a bed time story. Switch the light out. That's it. And that's what every parent up until about 1980 did, and it worked perfectly well. You know, you watch super nanny. You watch Jo Frost when she goes into these families, all she does is impose a bedtime routine. That's all the major behavioral changes.

- We have kind of forgotten that we are animals of routine haven't we?

- Absolutely. Absolutely. And you know, the story , bath, bed is a perfect wind down for the child. And you know sticking it in front of a TV, as an electronic babysitter is not the way to go. She asked about nutrition. There is no, if you eat a healthy diet, you do not need to eat or take anything else in order to ensure sleep.

- I'm flitting around a bit with the questions. It's hard for me there's so many that have come in. There are two here about dreams. Somebody says does everyone dream? I've never remembered a dream so I assumed I don't but I might just not be remembering them. Is it important to remember them? Why am I not getting enough sleep? And someone else says the same thing really. I don't remember dreaming.

- Okay. You can, everybody dreams. Everybody dreams four or five times a night, but you can only remember a dream if you wake up during it, or within two minutes after it has finished.

- And that's the universal rule?

- Yeah. Now you are preferentially designed to wake up during them. So if you woke up this morning without an alarm clock, you almost, always during REM. You would have woken up during REM and you will, to a degree remember that dream. And when you get up to go to the bathroom in the night, that's probably either three to three and a half hours into the night, or around five hours into the night, that's when you're having another REM period, another dream period. However, if you do not wake up during REM, you will not remember your dreams. But nobody has ever been found not to dream. It's just the fact that they don't remember the dreams.

- Robin, thanks for your question Robin. Robin said did we ever get to stage four? And I think that was the--

- Stage four is combined with stage three now into N3 as we call it. The American Academy of Sleep Medicine made this change a few years ago. But yeah, stage four was the deepest part of sleep. But they now say that clinically it makes no difference. I disagree greatly with that change, but they're more powerful than I am.

- Well yes, it's interesting that you say that. Somebody has also said that this is very fascinating stuff from where can they get hold of the research papers? I don't want you to just tell us now, but could we get the details on the papers that would be useful. We could put it up on the website--

- Yeah I can. I mean there are some sort of fundamental good reading papers but there are some good websites out there. The American Academy of Sleep Medicine has a very good sleep education website, and the National Sleep Foundation in America also has a lot of good information. They're probably the two best public repositories. But as I say, I can certainly give a list of definitive texts that would be useful.

- Yeah that would be very handy. And we'll just put them up on the website. Somebody's they asked if nine hours sleep is too much and you've answered that. It's what you need, it's important. Someone else has asked how you work out what you need. And I think it's whether you're awake during the day. And if

you are awake during the day, how do you know if you're sleeping too long? Can you cut back on it?

- Well no because actually you will actually know that you, you probably will know you've slept too long. There's something called sleep inertia, which is that feeling of grogginess that can occur in the morning. It can last in some people between 15 minutes and two hours. And that's common in people who sleep too long. But of course there also is morning ness and evening ness. Some people are morning people so they feel great in the morning and other people being evening people feel pretty poor. But if you are sleeping well, you should feel well. If you're not feeling well, and you can argue about what that term means, but if you're not feeling well, then you need to look at your sleep.

- How would you measure it in your sleep research?

- Well I mean you measure, you ask people the question. There's something called the Lead Sleep Evaluation Questionnaire which asks about getting to sleep, quality sleep, but also behavior following awakening. How do you feel once you've woken up? And you should never ask that within the first 30 minutes of waking up. You should never define yourself by how you feel in those first 30 minutes. Ask yourself at 11 o'clock. How do I feel now? Let's say for most people 11 o'clock is close to their peak. That's as good as you're going to feel all day. So if at that point you feel--

- It's worrying.

- Yeah it is. But that's the problem. People are going through life not feeling great because they're skimping on sleep. In this day and age I don't believe there are that many people who would be sleeping too much. I don't believe in our always on society that that's going to be an issue. But it certainly is about getting the right amount of sleep and one way, in a way, which is probably the most powerfully individual change that you can make to your sleep, is to fix wake up time every single day.

- Even the weekend?

- Even the weekend. And this again goes back to routine. The body starts waking up 3o minutes, sorry 90 minutes before you wake up. It starts preparing to wake up to hit the ground running. So if you set your alarm, your body knows when you're going to get up, so it can start preparing for that. So when you wake up this is why you can wake up before your alarm. So you hit the ground running. Now if you don't tell your body when it's going to wake up, it has no idea. So you may wake up, get up, and your body goes hang on, I need 30 minutes to get my act together. So that is probably if the body knows when you're going to wake up, it can fill the period you give it most effectively with sleep.

- So even if say it's the weekend and you go to bed later than you normally do, it's still better to get up at the same time?

- Still keep that routine.

- God that's a real disappointment to me.

- In an utterly perfect world, you actually have a 10 minute window in which to fall asleep, it's called the sleep gate. It's very, very difficult to find this out, you have to go into a isolation chamber for a few days, but we actually have an ideal 10 minute window to go to sleep.

- Same time every day?

- Same time every day. That's our genetic--

- Good Lord.

- Clock. But we don't know when it is, you know, as an individual. We should then listen to our body, but the problem is we don't. We go to bed when our partner goes to bed, when the news finishes, or when we've stopped binge watching something on Netflix, rather than actually going to bed. And the time for going to bed is when you feel sleepy, so going back to the person who asked the question earlier about falling asleep in front of the TV. If you feel sleepy, then you should switch the TV off and go to bed at that point, rather than sleeping on the coach waking up thinking oh I've got to go to bed and when you do go to bed, there's no way you're going to fall back to sleep. So you should very much listen to your body.

- There was a second part to that earlier question which is the significance of talking in sleep or night terrors. What, is that?

- Okay. Talking in sleep is a parasomnia. It happens during deep sleep, and it's related to things like sleep walking. Now during sleep, it's not an all or nothing phenomenon. Your brain is not completely asleep, and it's not completely awake. Bits of your brain are in different states. In deep sleep the conscious part of the brain is very, very deeply asleep, which is why you're not aware of your surroundings. But other bits of the brain can wake up, and if they wake up, they can do the thing that they're designed to do. Now the two things that we have developed which are unique, to us, compared to other animals, therefore we have a lot of our brain is devoted to these things is walking and talking. So, if the bit of the brain that controls speech wakes up, you'll talk. If the bit that wakes up you'll walk. And so that's why you walk and talk. Sleep talking has no meaning at all. It's the blabbings of a drunk person. And actually there was a research from France last week that shows you swear eight times more in sleep talking than you do in normal life. So it is really a drunk person in your head sort of thing. But it has no meaning. Sleep walkers do routine things. Things that they've done before. So they'll go and post a letter. They'll go to the fridge to get a pint of milk. Not very clever, because you could probably do that with your eyes closed, but interesting because you're doing it at two o'clock in the morning naked. Night terrors are again related. Night terrors is where the fear center of the brain wakes up. And so somebody having a night terror, there is no dream, there is just a reaction to fear. So if a child is having a night terror, observe them, but don't do anything. And the last thing you should do is wake up and say oh my God, that was terrible. Because the child will have no remembrance of it, but does know that it scared the living daylights out of mummy. So reacting in a completely calm way, they'll have no remembrance of a night terror. Now a nightmare is just a scary dream. But when you dream, dreams are real. So if a child is having a nightmare, there is a story, there is a threat, and it's scared

of that threat. So nightmares are more problematical than night terrors. So if a child is having a nightmare, waking them up.

- How do you tell the difference?

- Well, it's very difficult to do that. Night terrors happen during deep sleep, which usually in adults is in the first third of the night, but with children can be spread through the night. But it's about, it's about responding to the child. So being calm, not scaring the child with your reaction. Because they, if they wake up naturally from a dream then you need to deal with that. If they're in a night terror, they won't wake up. They may be screaming, they may be shaking, but they won't wake up. And so you'll learn to observe the difference in the behavior of your child.

- I'm conscious of how far we are through this, and we've still got a mass of questions here. This question actually has come in from Daniel. Thanks for the question Daniel, and he's probably getting very frustrated as the question came in a few days ago in anticipation of this talk. While promoting his new book, Matthew Walker who we mentioned earlier on said that changing the clocks in spring leads to a 26% increase in heart attacks as everyone loses an hour's sleep, and in autumn there's a 24% reduction in heart attacks when the clocks go back and everyone supposedly has a nice lie in. Is this true? Can it possibly be as sudden or as obvious as that?

- Like the first cuckoo of spring I'm waiting for the first nonsense article about the clock change. It is just frankly nonsense. There are, you know, you go from New York to Chicago in America and you've gone across one time zone. You go from London to Paris, you cross one time zone. You go on the Euro star, you get to the garden I do not see half a dozen passengers off Euro star collapsing on having a heart attack because they've gone one hour.

- So there's no evidence behind this claim?

- You can look for statistical blips. I mean you can prove anything with statistics. If you compare, I mean in America they don't actually have a standard policy on the

changes of the clock. Some states do, some states don't. Some counties do, some counties don't. It's a complete mess in America. There is a statistical blip in car accidents. Now you say that it increases heart attack by 26%. Well your risk on any one day in any one year of a heart attack is 2%. So you increase that by a third, you're talking about statistically you're much more liable to get hit by a bus. So people are rubbish with risk. There is, as I say, I commute backwards and forwards at least once a week across a one hour time change. I'm 52, I'm perfectly healthy, and if it was going to have an effect, doing that is much worse than having a clock. So basically what you're saying is, don't move from where you were born because you might. It's just puritanical nonsense.

- You puzzle me though. You puzzle me because you talked about the ten minute window when you should go to sleep and always getting up at the same time, but you've gone to live in a different time zone. People go across the Atlantic and live in many different time zones away from our own, how does the body adapt to that?

- Well I mean jet lag takes a week, a day--

- Does my 10 minute window move if I move to America?

- Your 10 minute window is genetically determined, but it's also got the effect of light and dark and food and everything like that, so I dare say, the picture is an awful lot more complex. Our body has a rhythm of 24 hours and 17 minutes. It's known as the tow. So our body is flexible enough to cope with the three minute change that there is today. Length. Every day we go sunrise, sunset, changes by three minutes. We've got that flexibility. And from an evolutionary point of view, we were never designed to move away from our, up until the 18th century, people didn't move more than five miles from where they were born. So we were not designed to cross time zones. But there again we were not, we're not designed to travel faster than we can run. That means we should never get in a car. Certainly we should never drive a car. You should never get on a plane. So, modernity is different from being a caveman. But cavemen died when they were 35, and we now live longer than we've ever lived. So if our modern life, time change was a problem well then why do we live longer? Because we've only been changing clocks since 1919. So this is where we get so fixated on making rules and basically scaring the wits out of people about sleep, when actually, if you remember I said earlier

feeling well. Now that's a a very very broad term, but people know when they feel well, and when they feel unwell. So if you're feeling well, then to be honest, don't worry whatever you do. And yes, I fly at least twice a week, if not more than that. If I didn't feel okay, I would stop doing it. But the fact that I do feel okay, means it's probably not doing me any harm and I sleep perfectly well of a night. So don't be, you can argue for many reasons whether you should change the clocks, whether it makes sense, but it really isn't going to matter because the sun still comes up when it was designed to come up. We've just called that hour a different name. That cannot cause heart attacks. Because the sun is still coming. And you're not losing sleep, unless, somehow, you can guarantee or gaining sleep, that you are going to sleep that extra hour. You're not. Because if you are in any way in a routine, you won't sleep anyway, so it's a nonsense.

- We've got a few minutes left, and I think there are a number of questions still on my list. And what I proposed to do as I often do when we're over inundated with questions is I'll put those on the forum, below the recording of tonight's interview, and I'll ask Neil if he'll answer those afterwards. But I did want to try and take this down a clinically relevant route if I can, and you've mentioned here and on other articles that I've read from you that lack of sleep can affect pain. Lack of sleep can affect weight loss or weight gain. What should we be looking for in clinic. What are the signs we should be looking for in our own patients where we might start asking questions about sleep quality and--

- Okay. The key thing, the absolute key thing is the differentiation between being sleepy and being tired. Because people use the words interchangeably, and they mean two different things. From a sleep point of view. If you're not sleeping well, you will be sleepy. Tired tells you nothing about sleep. Tired is what I like to call, having a bit of a rubbish life. Tired is it's Tuesday, it's dark. It's raining, I've got to go home on a train, it's going to be miserable. You know, life's just a bit ner. That's being tired. There's little you can do to somebody being tired. But people complain of tired and you don't know whether they mean sleepy, or tired. The simple way is if you climb up three flights of stairs, when you get to the top, do you need a sit down or do you need a sleep? If you need a sit down, you're tired, fatigued, knackered, exhausted. If you need a sleep, you are sleepy. So only the sleepy people can you do something about. And that's the key thing. 'Cause just trying to improve the sleep of a tired person is going to make no benefit. And then really you need to work out if there is a problem. So four simple questions. How do you feel during the day? Awake, fine, you've not got a problem. Sleepy, you've got a problem. Are you satisfied with your sleep? And that should be a yes no. Yeah I'm satisfied with my sleep. I feel awake during the day. There's not a problem.

No I'm not satisfied, you're probably looking at insomnia. Are you excessively sleepy during the day? And excessively sleepy is not feeling a bit dozy while sitting in front of your computer at two o'clock in the afternoon. Excessively sleepy is falling asleep during a conversation. Then you're looking at probably something like obstructive sleep apnea, narcolepsy, or hypersomnia, needing too much sleep. Then do you do anything during the night that annoys your partner? Do you punch, kick, walk, talk, do you do. But there must be a reason for that. Yeah do you do something that is noticeable to your partner and if you get the wrong answer for that then you need to probe a bit further. What do you do. How tired you are. So taking a good sleep history. That can take time, but those questions are the very basic questions you need to answer. They need to either be, take a more comprehensive sleep history, or refer to the GP.

- And is it easy to take a sleep history?

- I can give you a questionnaire that I've developed that gives you those four questions plus supplemental questions to ask and sort of points you that this might be something that you can do something about or something that you should send to the GP.

- Relevant to this is one of the questions that came in earlier, is there any evidence of sleep deprivation, lack of sleep leaves people more susceptible to injury.

- Absolutely. Certainly from the sports science field. If you exercise when you are sleepy you have a 34% increased risk of suffering a sports related injury. Plus recovery time. It takes longer to recover from an injury if you're not sleeping well. So a lot of sport teams are trying to improve sleep, not just because of the performance benefit, but also because of the protective and recovering benefits of getting a good night's sleep.

- I suppose also trying to make sure I've got your terminology correct there is considerable evidence that when people are tired at the end of a match, then they are more susceptible to injury then as well.

- Absolutely yeah.

- I'm sure we all get asked this, you more than most people, but what do you tell people who say well what is the best mattress for me and the best pillow for me?

- There isn't. I mean, the whole point with a mattress is comfort, and science can't measure comfort. Unfortunately, bed manufacturers make it incredibly difficult to buy a mattress because they use stupid terms like soft medium and firm, which mean nothing at all. Nothing about the visual aspects of the mattress tells you whether it's comfortable, so what it's made of, what it's filled with, how much it costs, are not a guide to comfort. The only way you can know how comfortable a mattress is is to get on it, lie on it, change position on it, and to be honest you will know. That mattress that you go wow, that's great. That's the mattress to buy. But one of the biggest myths about mattresses is that if you have got lower back pain, you need a firm mattress. You do not, the last thing on earth you need, is a firm mattress. You actually need a softer mattress. That's not say a soft mattress, but a softer mattress. So for me, I'm about 120 kilos, I should be on, for my weight, I should be on a firm mattress. If I had a bad back I should be on a sort of a firm medium rather than a firm mattress.

- Yeah you're talking to an audience of chiropractors and osteopaths and I suspect they have their own sort of guidance for things like that.

- Unfortunately I've heard so many practic people come up to me and say I've been told by my chiropractor I need a firm mattress. I have heard that so many times, and it is really, really scary. Because there is--

- I think it would be interesting to know from our viewers what they say, because frankly my view is that you cannot prescribe what is the best mattress for anybody. As you say, what they find comfortable. And there is, and I'm annoyed with myself for forgetting the name of the company, but there is a company that produces a variable density mattress which they will allow users to trial, I think for three months and that's the only way to find out, I think whether the mattress really works.

- Absolutely, and I think that that's the key thing is you know you can guide people towards mattresses, but it's their weight, their shape, their other medical conditions, et cetera et cetera, all of these things are characteristics, and you have no idea what for somebody is comfortable. And I can remember being in a bed showroom in Canada and this very slight Asian woman saying I need a firm bed, I need a firm bed. I said, really you don't. She said no, I need a firm bed. I said look, let's not argue about this, I'm a sleep expert you don't need a firm bed. She said, I'm Cambodian and for the first 45 years of my life, I slept on the floor. I need a firm bed. And I said, right, fine. You trumped my expertise completely with that. You know, buy whatever bed you want.

- Yeah, okay, let me just ask you. Is there any known reliable correlation between psychopathy defined here as delusions of grandeur and reduced need for sleep?

- I would think that's true. I mean President Trump is a great example of this, but I think other people say it of people. I think Trump is one of the only people who actually makes the claim himself. But for other people who have been claimed to be short sleepers I think other people have done the propaganda for them.

- And a very quick question from somebody who says there's some fantastic nuggets of information in here are there any recommended drugs for people who are suffering insomnia? What are the best ones?

- I mean the Zed drugs, the newer are good to help you go to sleep. They won't keep you asleep. We don't have any medicine to keep you asleep that would probably be recommended and we don't have any drugs that help with waking up too early in the morning.

- Right.

- So we're still a long way from that, but for most people there is an awful lot they can do for themselves before they should ever be thinking of medication. It's just

doing those things seems maybe, maybe we just have too much information that we've confused people. And that I think is probably a big problem and we had, there's a paper I had from 1911 called Insomnia is Dread and actually it's the fear of not sleeping that is actually causing us not to sleep, and I think we've wound ourselves up so much about the importance of sleep, that we're over analyzing as you say, with Fitbits and that, and we're worrying about sleeping and therefore we're not sleeping. So I think that might be probably the biggest problem we need to address.

- Well, what I can suggest is hopefully that we can put on our website the papers that you referred to. You can put up the sleep history and guidance that you can provide on how to advise people on getting better sleep, which is not just the ten--

- How to get a good night's sleep no problem at all.

- Neil it's been fantastic. We've seldom had so many questions and it's been a really interesting evening. Thank you so much for coming in.

- Thanks very much. Thank you