Danny Lennon: Ian welcome back to the podcast my man.

Ian Dunican: Danny how are you doing?

Danny Lennon: I am doing very well and I am very much looking forward to this conversation given what we've kind of been talking about off air so to speak. So before we get in just as maybe a refresher for regular podcast listeners or maybe some newer listeners who didn't catch your previous episode, can you just give us some background on your particular field of work and your expertise and kind of some of your background details?

Ian Dunican: Yeah, sure Danny. So as people can hear, I am Irish, born and bred but lived here in Western Australia for the last sort of 16 odd years. I started my career off in the military, then worked in mining for a long time over here and predominantly in health and safety, with a specialty in fatigue, management and human performance. And towards the end of that then, I started working more with athletes and in the last few years I have completed my PhD with the University of Western Australia in sleep and performance with elite combat and contact athletes; in particular, I worked with the Australian Institute of Sport, with some of their combat athletes there; and then with the Super Rugby Team, the Western Force, looking at sleep and performance as well who no longer exist but are back in a different form. So my sort of career has spanned across military, mining and elite athletes and predominantly around sort of fatigue/human performance and in this area.

Danny Lennon: Awesome. And so the last time you were on we talked about a number of different things related to sleep and elite athletes and since that time there's been some more work that you've been involved with that has been published or soon to be published, that I want to get into. One of the first areas relates to the weight cut for combat sport athletes. And this for people you've listened previously, we had mentioned some stuff for combat sport athletes on your last appearance, we also had real talk about some of the water loading study. But for this specific aspect of the study where you looked at the effect of sleep, can you just give us an overview of where that stemmed from and what exactly you were looking at and what question you are trying to answer?

Ian Dunican: Yeah, so I was involved at the Australian Institute of Sport with Reid Reale. As you said, we did our PhDs there and Reid was sort of heavily embedded at the IS. I went in there to do a few projects and Reid was looking at the effects of different strategies for weight cutting such as a low fiber, low residue diet and water loading. However, in sort of collaboration with Reid, we looked across the literature and there's no published literature really out there on how does this weight cutting process affect sleep and recovery and sort of other metrics across the week. So together we said, well, look Reid was doing this water loading study at the AIS in Canberra and he had 22 athletes involved in that. So I sort of piggybacked off the back of that with Reid and we really wanted to see was there a difference between the two weight cutting strategies across the week, the low residue diet or low fiber diet versus water loading. And initially, we hypothesized that those in the watering group would actually have more sleep because people would suffer from nocturia which is basically more frequent awakenings overnight because they would have to get up and go to the bathroom and this will be due to the volume of fluid they will be consuming during the day.

Danny Lennon: Let's talk about some of the methodology then. How did you go about capturing the data and what exactly were you looking to measure and how did that process look?

Ian Dunican: Yeah, so we had the two groups, we had the control group which was the low residue diet group and we had the water loading group and we had 22 athletes overall, and our methodology here was a combination of objective measures used in the ready band device which is a sleep-wake activity monitor from fatigue science

in Vancouver, Canada, which has been used across numerous professional sport teams, the Seattle Seahawks, Chicago Cubs, big news here in AFL and in elite rugby as well, and it's used by the Wallabies currently, and that's also a device that I validate in the laboratory against the gold standard polysomnography. So we use that device to measure sleep across the entire study for both groups. We also administered a number of questionnaires looking at the prevalence or the potential prevalence of sleep disorders particularly for things like obstructive sleep apnea, daytime sleepiness, any insomnia and always the chronotype of the athlete as well, did they like to get up early and go to bed early and so on.

We also talk a number of other measures such as blood pressure and heart rate because with this type of study we wanted to make sure what excessive water loading and/or increased water, that there was no effect on these measures. And also as well, we took measures of the leg and the neck each morning because of maybe bloating from the volume of water consumed as well. So that's how we collected that, this is quite positive and natural really over the week and quite easy for the athletes to interact with across the study. So it was a nine-day study, we had three days of baseline testing so we could kind of wash out any sleep back there as well and then the experimental phase went for five days and then on the last day during the rehydration we had our final measures from the athletes.

Danny Lennon: Yeah, and when you mentioned the ease of implementing something like that, with the athletes or offer them to take onboard, I suppose that was a key part for this particular study, given you are looking at competitive athletes and anything super invasive is going to be difficult to do with athletes who are going to be competing at a level that we want to look at.

Ian Dunican: Definitely. And it's a good point Danny, because often we get criticized or we criticize our oursevles about we could have done this, we could have done that, but we have to balance the studies I think because we would have loved to have some higher level I suppose polysomnography devices on these athletes each night but the cost, the time, the logistics and everything else that's taken time in the study as it has to be accounted for as well, because Reid has data as well and you just can't hold them as lab rats constantly every minute of the day and they had to do training throughout the day as sort of training in specific grappling

throughout the day as well. So we had to be mindful of that balance.

Danny Lennon: So if we start to look at some of the results and what you got from that data you collected, what's the first few things to mention, where's the best place to start on this?

Ian Dunican: Some of the subjective measures that came out was pretty interesting and so when we asked athletes some questions via the questionnaires we found out nearly all the athletes rated that sleep was an important part of the recovery process throughout the week, so throughout our fight camps, so that was good, no surprises there, and low number of athletes consumed sleep medication to get sleep or stay asleep. And there was really no high prevalence of sleep disorders from the questionnaire methodology within the athletes. And in terms of chronotype, most of them were what we call a normal chronotype. So go to bed at 10 or 11 o'clock at night, wake up at between sort of 7 and 8 each morning, so this kind of middle of the road chronotype so nobody was extreme; so extreme lark being a morning person or an owl being a night person, so in terms of those subjective measures, there was nothing that was too crazy for us and sleep was good, the weight changed obviously across the week as part of the study, so it was no surprises there.

And in terms of sleep, we didn't see a massive difference between the groups. But what we did see within the group was fragmentation index and wake after sleep onset was quite interesting in those in the low fiber diet group, so the control group, and fragmentation index is the number of awakenings during sleep. So we found this was pretty similar between the groups and wasn't too bad, but we did find that in the wake after sleep onset that the control group spent longer awake than the water loading group so even though a similar amount of awakening numbers that the duration of awakenings was longer in the control group.

Danny Lennon: So, after seeing that what type initial ideas or hypothesis did you come up with that that might be able to explain why we would see that?

Ian Dunican: When we look at the literature outside of athletes we find that it's been reported a few years ago that a low fiber diet is associated with an increase in sleep issues overnight. So greater sleep

latency, so time to fall asleep and we also see more awakenings as well, and this is what we did see within a control group, and so I should have mentioned out there that sleep latency was higher in the control group as well, which is time to fall asleep. So this is interesting that the control group had this. We thought initially that the water loading group would have more awakenings in just two-three months, the fluids they were consuming, as I said earlier, but this didn't seem to be the case. So it was a pretty interesting finding here with these athletes.

Danny Lennon: Yeah, that is interesting. I wonder how much of a difference we would see if you plot it, what happened in this particular study versus some of the more, let's say, crazier weight cuts that athletes can be doing, because the protocol used by Reid [Reale] was the water loading and restriction and a certain degree of dehydration, wasn't anywhere near the level that you would expect to be completely unsafe or dangerous and certainly not this prolonged dehydration for many days that I know some athletes anecdotally can go through, so it would be interesting to see once people start to do those more crazier protocols, what effects that may have had I guess.

Ian Dunican: Yeah, I totally agree Danny as well, I think within this study, this was obviously very well controlled by Reid on his parade. It is the correct way to do a weight cut, and I think in those other ones you would see probably more awakenings. I do think that we couldn’t simulate this and we will be very interested to do and we would have to kind of constantly take measures from different athletes across the board is the week of the fight. And I spoke to Corey Peacock about this, who trains a lot of elite fighters in Bellator and UFC, he was on my podcast recently, we spoke about this as it is a fight, it's a week of a fight and no matter how many lab based studies we do we can never replicate that because these guys aren't fighting each other at the end of the week in the study. But if you have the nerves of a fight, you've got the media surrounding a fight, and radio, phone calls, TV appearances, the whole kind of circus that goes with the UFC event or a Bellator event or any other sort of event like that, and I think this would be very interesting to see that how much this would affect the measures of sleep during the week and how bad people feel, and would that affect the weight cut as well, because we know that when people get extremely tired or sleep restricted they tend to get an imbalance of ghrelin and leptin, these appetite regulators, and then maybe they start overeating or they start going for more

sugary food, and then I think that will be a very interesting area to go next with somebody's weight cutting data.

Danny Lennon: Yeah, for sure. And just as you are talking, the fact that when someone is already anxious or nervous about an upcoming bout, they have this, probably some sort of caloric restriction in place, now they are doing this weight cut, so there's all these stressors that are coming into play and like you said we know that those things can influence leptin and ghrelin, it can also maybe drive up cortisol as well and that may play a role in water retention and all these counterproductive things for the weight cut itself, so it's maybe this vicious circle of one thing feeds into the other, and back around again.

Ian Dunican: And I think Danny that's a good point because if we take a step back and we look at combat athletes and contact athletes, we probably think there's a lot of work done in this area and there's actually very little. We had a publication recently looking at the prevalence of sleep disorders in elite rugby union players, the first time that was ever done using in laboratory polysomnography, and we found a higher prevalence of sleep disorders in those athletes, predominantly sleep related disorders such as obstructive sleep apnea and restless legs, and a greater prevalence in these athletes then compared to the general population. So we found, in general population one in five people will have a sleep disorder, we found the athletic population is one in three. So, does any of these athletes have that sleep disorder? Has that been exacerbated during the week of a fight and during the weight cut as well? Also you mentioned about cortisol, when cortisol is high, this inhibits melatonin, which is important for sleep, so we have this kind of inverse relationship going on with those, if then athletes are using electronic devices, exposing themselves to bright lights and particularly for those high level athletes, getting around Vegas, extreme light exposure inhibiting the release of melatonin are all these other factors planning to how they feel during that week of a fight.

Danny Lennon: Sure. And so with that there's obviously some things that we could do from a practical perspective to try and mitigate some of these things that could cause poor sleep over the course of fight week, but obviously some are maybe out of control as well, like we are never going to get a fighter who's not going to feel some degree of nervousness or anxiousness towards a fight. So from a practical perspective, what are maybe some steps athletes could

take? Is this where something like trying to presume that they will have some loss of sleep, so maybe banking extra sleep or is there anything else they can do to try and maximize their sleep quality over the course of fight week if they know it maybe going to degrade at some point?

Ian Dunican: Yeah, for sure. So one thing you mentioned sleep banking or sleep optimization as a strategy is used a lot with athletes and even in military as well, so you are really focused on getting as much sleep as you can, before the week of a fight and even during the week, so wherever possible getting sleep and that includes potentially napping whenever possible. And if you can't sleep or you can't nap, at least spend some time lying down or just relaxing. This also will help the athlete during the week.

The other thing as well that helps is kind of basic sleep hygiene, so paying attention to the sleeping environment; and for many athletes to have to travel for an event or a fight, and so sleep environment and sleep hygiene issues are very important. So when they do get to a hotel room, making sure that all external sources of light are blocked out, any sort of lights in the room LEDs, TVs, all the extra stuff is turned off, the room is nice and cool, you got the correct pillow, or maybe not ringing the reception to get a firm pillow or soft pillow, whatever suits, and setting up the room that's conducive to sleep for the athlete. And all these techniques can really promote sleep during the week and can be a heaven for athletes to retire, to get some sleep or some downtime.

I'd really advise well against athletes using the room as a kind of a meeting room or having, you know, people coming and going all throughout the day which often happens particularly in MMA athletes, it becomes this kind of thoroughfare, and that room should be this kind of hollow ground where the athlete can retire to, and relax during the week of a fight. So those basic sleep hygiene principles around the environment are good. In addition to that, use of iPads or electronic devices before bed, can all help to increase – decrease cortisol, increase melatonin and allow the promotion of sleep and allow the athlete to rest and relax before sleep. So any of these strategies can be used to help the athlete.

The other one as well Danny which a lot of athletes don't take into account is jetlag when they are flying to a new destination, and the other one might be as well as altitude, so we know that

when people go to altitude particularly above sort of 5 or 6000 feet or somewhere like Denver, Salt Lake City, that sleep will actually be difficult as well. And if you have a sleeping breathing disorder, this will also be exacerbated by altitude. And we've seen that in some performances as well probably; in places like Mexico City, some athletes didn't do too well, didn't probably acclimatize correctly, but if they have any sort of underlying sleep disorder, it's just going to be worse during the week, because it is very difficult to fall asleep at altitude and get into stage 1 sleep. So all these things should be considered, so jetlag, altitude and taking this holistic approach to your sleep.

Danny Lennon: Yeah. So you gave a great list of things that athletes can do and can focus on. I am trying to think of some ways that maybe at least anecdotally or previously people who are worried about their sleep may resort to that maybe not be so productive. So if an athlete is hearing that or they are experiencing poor sleep and they know it's important and they want to try and improve that throughout the week, turning to things like sleeping pills or having a drink before sleep or smoking weed or whatever it is that they try and get to sleep by, is there something for example like the sleeping pill that may have them unconscious, is that still going to be as productive as doing those other things to allow for let's say natural sleep?

Ian Dunican: Yeah, you mentioned some strategies there that are used by a number of combat athletes and if anybody listened to one of Joe Rogan's podcasts recently who used to always advocate about smoking weed and Matthew Walker went on and kind of blew out of the water with some of the data on marijuana. It's going to affect your sleep overnight as well as alcohol as you said and many people will swear black and blue to alcohol as good like one or two, because it helps you fall asleep and that's correct, it does help you fall asleep but it will lead to more awakenings overnight and it will lead to dehydration and making you feel cropped the next morning, so that's a problem as well.

In terms of sleep medication during the week, I always urge athletes when you are looking at sleep medication as number one, look at the rules around sort of doping or USADA and all this sort of stuff that goes on by athletes, always consult those first and see what's allowed. The next thing as well as sleep medication as a short term effect can be useful, but it's not recommended long term, and actually studies show that long

term sleep issues are better resolved with cognitive behavioral therapy, so working with somebody and even use of chamomile tea has been shown to be more relaxing and promote sleep as opposed to long term sleep medication over a five-year period. So definitely, staying away from long term sleep medication is recommended.

Danny Lennon: One thing that I did want to get to before I forget and we had a bit of a chat before this podcast about it, was the potential implications for traumatic brain injury like we know this has become a huge issue within a lot of contact sports over the last few years and the conversation is thankfully growing around that, and we know there's going to be some degree of head trauma during an MMA fight or a boxing fight. And so when we are talking about the effects of sleep here, there's a few areas we can touch on and one that I'd been thinking about is if there is going to be clear sleep restriction, does that have any knock-on implications for someone going into about where they are going into experience head trauma and then the flip side of that which you mentioned to me Ian could be the opposite of once we know there's going to be trauma and the effects on sleep. So where is the best place to jump in on this, because I think this is a fascinating area?

Ian Dunican: Yeah, look to the best of my knowledge I don't know if sleep is going to – you know a lack of sleep prior to a bout is going to increase traumatic brain injury. However, what I would say is that during the week, sort of let's say a fight is on a Saturday night and the athlete is not getting sleep during that week, well, that lack of sleep or sleep restriction or sleep loss across that week is going to affect performance. So to give people a bit of an idea, if you've been continuously awake for 17 hours, your reaction time is equivalent to somebody that's intoxicated to 0.05 percent. If you are awake for 24 hours, that's the equivalent to being intoxicated to 0.08 percent, and what that means is you will have the same reaction time or reduced effectiveness during that time. So we know that sleep loss definitely affects cognition and it affects cognition and reaction time before it will affect physical performance, and so multiple studies have shown that over the years. In the context of particularly striking martial arts or MMA, lack of sleep or sleep loss during that week may not allow the athlete to be fully sort of on the ball and not able to react so, you know that split second time to sprawl, to slip the jab, to get out of the way, and that may not be there for the athlete on that specific

evening. And particularly, you see this a lot with UFC athletes who travel and can pee at weird times. We see that their reaction time is pretty poor. That's not objectively, that's probably just subjectively eyeballing that as a fan; but when you look at a lot of the athletes who fly a lot, probably they have sleep loss, they tend to not do so well in those bouts.

And from the other side, Danny, as you said, if a fighter goes in and sort of experiences a lot of headshots and takes a lot of trauma, well – and we see this in a lot of military people as well, is that they are going to have disrupted sleep and some people can have disrupted sleep for years afterwards as well. And we see this more in laboratory studies where the EEG is affected, so we see lots of awakenings, lots of arousals in the brand overnight and so this can go on for a long time after as well. And I don't know how much of this is actually measured in combat athletes post fight and in regards to sleep, but we do see from military that a lot of athletes have sleep issues.

Do you know what as well Danny that's interesting is that in a subjective self-reported study from ex-rugby union players from Ireland, England, Wales, sort of home nations and from South Africa, is that about 60 percent of those ex-rugby athletes reported higher prevalence of common mental disorders and sleep issues as well, which could also be linked to head trauma over the years.

Danny Lennon: Yeah, it's such a complex area and I think when you are saying that, this head trauma can then in and of itself lead to sleep issues and sleep problems over time knowing that some of the training modalities that some fighters use where they are going to do heavy sparring, more regularly than they probably should and in a not so smart fashion in the days or weeks or like you say, even maybe longer periods of time after that, if there's going to be effects on sleep and then that ties back into worsening of reaction time and so on, and that's going to lead into them getting hit more, and then this kind of vicious cycle goes and goes and goes, it's so interesting.

Ian Dunican: Yeah, and I think generally across the board, there's been very little research in this area, particularly in combat athletes and I don't think a lot of coaches or athletes actually pay this area enough attention. Generally in sport recovery is a very kind of a small area in terms of performance. We spend a lot of time on

getting ready for a bout, getting ready for a competition, getting stronger, getting bigger, getting faster, but we don't spend a lot of time looking at the sort of the downside of it in terms of recovery. And so sometimes we do want to build upside and actually have a negative effect on the recovery as well. One of the most interesting examples of that Danny is probably the overuse of caffeine through pre-workout and so on and even the timing of sparring, the athletes have sparring at night after work or take pre-workout at 7 or 8 o'clock at night, sparring in the gym for a couple of hours, and then expecting to fall asleep by 11 o'clock. It's just not going to happen.

Danny Lennon: Yeah. That was an area I was actually going to ask about is this impact of later night training sessions and particularly when you look at guys who are maybe doing MMA and they've multiple sessions across the day. One of them is typically coming the evening time but I think, like you said, if that's going to be a high priority, heavy sparring session, and then they are also taking stimulants and then the arousal levels from actually doing a sparring session like that, the effects of that on sleep and that can bleed over of course then into recovery of the next few days after that. I am just thinking about then from a practical perspective, obviously there's things athletes can do for recovery. But from your perspective, trying to maximize sleep, is there anything you would recommend to coaches perhaps of how to structure the training week that may prevent some of those negatives that we can see on sleep because of the training schedule?

Ian Dunican: Yeah, and I wrote a three-Para blog for this Danny on my website about this, which was published in the martial arts magazine Blitz here in Australia which unfortunately no longer exists, but people can access that three-Para blog on my website sleep4performance. But to answer your question, definitely, and I think this is a gray area, I think fighter camps could look at scheduling of training sessions and you can do this using modeling software and people like me can do this for – we do this for teams, we do this for businesses and we actually use sophisticated modeling taken in all these different variables that actually work out what's the best time out there for these athletes to train. And we walk back from the time of the fight, so all I advocate is work back from the time at a fight, when is the fight on, is it on a Saturday night, is it on a 9 o'clock, 7 o'clock, is it on during the day, and so we should bear that in mind; because if the person is an extreme morning type, and the fight is at 12

o'clock at night, like in the UFC in the main event, well, then maybe you want to look at trying to change that athlete's sleep cycle. So as in, we want to shift them more to a late night and we don't want to have any early morning training sessions, we want to push them all to the evening.

So and then particularly in the weeks before the fight, we really want to start pushing that person to be the night person, and you see people like McGregor doing this, Bisping been doing this. If you look at the UFC countdown footage, it will say on the corner 1:10 AM and – sorry yeah, at 1:10 AM and like a lot of these main events can happen between sort of 12 and 1 in the US local time. So they are kind of sparring and they have to replicate those conditions. Now that's great because they are professional athletes and they can take the next day off and sleep until 2 or 3 o'clock, but we're now learning the problems with the amateur athletes, because many amateur athletes will have a job and so they will have to get up at 6-7 o'clock next morning and what we are doing here now is we are actually completely reducing the opportunity for sleep, because if they spar in the evening between 8 and 10 o'clock and then they go home, have some dinner, it's going to be at least 12 o'clock midnight to 1 o'clock in the morning, and they are getting four or five hours of sleep, then they are tired; and like you said Danny, it becomes this negative cycle that they get into. So they may have to pick and choose which nights to their sparring, so it might be a Friday night and then the athlete can sleep-in the next day to recover from that or a Saturday night, but they need to balance their work and life. This kind of rocky attitude of getting up at 4 o'clock in the morning and going running before work, then going to the gym and sparring there at 8 o'clock, 9 o'clock, 10 o'clock, the athlete is just going to fall apart. And unfortunately, I've seen a lot of amateur fighters go through this and get advice for sleep, and I've said to them, you have to completely redesign your camp and what you are doing, they didn't do it, and guys on paper that should have won, lost because of this, because they just completely wore their body down over time, and then when they got to the weight cut as well they completely were just a shell of their former selves so to speak.

Danny Lennon: Yeah, it's amazing what people can put themselves through when they are, like you say, we have athletes that are so dedicated and this extreme mental toughness, almost to their detriment at times because they feel they can just push through stuff, and like you

say, it's going to catch up with them eventually. One final question I did have around that is looking at the demands for sleep as the training workload maybe increased, which is something again we typically see as an athlete moves from maybe not having a fight booked, then they get a date for their fight and now they are kind of fight campus starting and you start to see a ramp-up in either training frequency or the overall workload. Is there anything that we know about demand for sleep with increasing training workload, does it change much at all or how do we frame this?

Ian Dunican: Well, specifically in combat athletes we don't, but we do know that the more physical activity we do, the more non-REM sleep we need for recovery, so non-rapid eye movement, this is more the deep sleep which will be responsible for a release of growth hormone and then from a cognition point of view it's the REM cycles that we need, which typically happen between 3 and 6 o'clock in the morning. So if athletes are getting up ready to train, they are going to inhibit this or they are going to bed late, they are going to sort of enter the first part of those non-REM cycles. And so, I would advocate for athletes that turn sessions you need at least 12 hours and that gives you enough time for sort of food, rehydration, giving yourself at least the sleep opportunity of between seven to nine hours in there, and it's enough time to get up and sort of get started for the next day, so at least 12 hours between sessions will be a good rule of thumb to have. If that's not achievable, then schedule in some napping or downtime during the day and you may need to increase as the fight count progresses as you said, because as the workload increases.

But it also depends Danny on the strategy. We know that different fighters do different things, some just really focus on strength and condition in the fight camp, others are just skill based. So it's going to depend on that as well, I think it's going to depend on the fighter. So a bit like diet nutrition, we can't make blanket statements across for everybody, it's going to be a bit dependent on the athlete and what the athlete likes and then we also have taken to other factors like family as well, any other sort of core commitments and balance all those factors out. So it can be quite difficult for some of the athletes to do.

Danny Lennon: Sure. From a research perspective, you've already mentioned it, we still have quite a number of questions that we need answers to. So what would you like to see answered in the coming years in

this area or any kind of related areas of interest to you that you think are some big research questions to answer?

Ian Dunican: I would love to see this study here replicated in fighters during the week of a fight, like to really see what's going on and take some more measures of a schedule. We could use biomathematical modeling to actually construct the schedule of what's happening. I've been privy to some UFC fight weeks with some athletes and I've seen what they've gone through in terms of media obligations, I would like to plug all that data in conjunction with the data that's coming off the sleep watches, the ready bands and plug it in to actually work out the effectiveness of the athlete when it comes to fight time; because with that data, we could actually work out – during a fight, we could say this athlete was at X amount percent effectiveness and had 30 percent worse reaction time, and then look at that data to see how it felt and look at the other metrics as well that were performance based. That's where I think it could go. Now, that will be obviously not a big group study, but you could continuously regroup people over different fights across the year. That will be a great way to do this or with a number of athletes to actually see what happens in that more applied setting, that's where I think it would be very beneficial going forward, and then may also help the trainers in terms of what to do during the week of a fight as well in terms of constructing the training that goes around that media or obligations.

Danny Lennon: Yeah, that sounds amazing, yeah. So that would for sure give us lots of interesting data to work with. Ian, we are just coming up close to time here, so before we go let people know where they can find you online and keep up-to-date with what you are doing and get more of the content that you produce.

Ian Dunican: Yeah, so you can go to sleep4performance.com.au and there's a website there which has got a free book to download, it's got my research there, there's YouTube videos there, I did a TEDx talk in Perth last year on sleep and performance, I think it was titled Sleep in... and win! There's other media tips there around these studies we've completed as well with other athletes such as basketball and rugby and so on. So there's a range of stuff there and blogs and so on. It also gives links out there to my podcast called Sleep4Performance Radio which we are in Season 2 and we have people on there this year which I think you've had on Danny as well, Amy Bender, Shauna Holtson, Corey Peacock. We even

get into sleep in Tibetan dream yoga, so we go down in all sorts of avenues with that one. And from a business perspective and for consulting in sort of industry and with elite sports, you can go through meliusconsulting.com.au and you can find me on Twitter as well at sleep4perform and Facebook as well, Sleep4Performance, or you can just type my name in Google, I am sure you will find some way of getting me or hitting me on Twitter as well. Always happy to talk sleep to anybody.

Danny Lennon: Perfect. And everything that Ian has just mentioned I will link up in the show notes for you guys to go and click through and I highly recommend checking that out. And with that that brings us to the end of the show my man, thank you again for coming on, discussing some of this interesting work and giving your insights, it's always a pleasure.

Ian Dunican: Great, thanks very much Danny and I appreciate you having me on again, to be a two-time guest, I was more nervous this time than the first time now that you are a big time worldwide podcast.

Danny Lennon: Not at all, thank you so much for doing it my friend.