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Dr Hazel Wallace: Never before has the immune system had so much air time, but what actually is the immune system? Can it be boosted, what kind of things influence it? Does vitamin C really fight off a cold, and is there truth in the old wives' tale, feed a cold starve a fever? I'm Dr Hazel Wallace, host of The Food Medic podcast and on this episode we're answering all those questions with immunologist and author Dr Jenna Macciochi. Jenna has a PhD in allergy immunology from Imperial College London and had previously worked in academia, the pharmaceutical industry and clinical trials. Jenna currently holds a lecturer position at the University of Sussex, progressing research into understanding the science of lifestyle related disease. I think first of all, I would just love by asking you a little bit more about you, who you are what you do and what you're passionate about.

(TC: 00:01:28)

Dr Jenna Macciochi: Yes, so, my name's Jenna Macciochi, I'm an immunologist. I'm currently at the University of Sussex where I teach immunology to a broad range of different degree programs, pharmacy, medicine, biomedical science. Anyone who needs to know about the immune system, and I've been in the field nearly twenty years. I love research, I'm really passionate about immunology and the immune system, and I feel like it's one those field where the more I learn, the more I feel there is to learn. And I'm so passionate about all the different inputs that are shaping our immune system. Because as I came to realise a few years ago, there's so much written about the immune system, but not all of it is incredibly accurate. So I like to try and communicate what I know in a way that's really accessible to people, and, kind of, inspire them to see the immune system as fascinating as I do.

(TC: 00:02:23)

Dr Hazel Wallace: Yes, amazing, and I completely agree with you, I think there's always chat about the immune system and immunity, and, I mean, the last couple of years it'd never been such a hot topic. But I don't think everyone fully understands what we mean when we talk about the immune system.

(TC: 00:02:42)

Dr Jenna Macciochi: I know, I think that's a great place to start because we do tend to, kind of, speak about it as if it's a binary on off switch. You know, you want to switch it on, you want it boosted, you want to turn it off again. But it's actually, as the name suggests, a system. So I like to see it as a, kind of, all embracing, all encompassing wellness system. It's as indispensable for your health as your heart or your lungs, and it plays an important role, not just an infection protection which is mostly what we think about when we talk about our immune system, but it's really important to all areas of your health, including mental health. It's, sort of, everywhere and nowhere, so it includes everything from your white blood cells, which are found not only in the blood, but they tend to be congregated at the body barriers, so that would be the skin, the lining of your lungs, the lining of your digestive tract. Anywhere that's exposed to the environment, and where there could be some trauma or infection, and you might need the immune cells to dive in and do their work. But we also include the barriers themselves to your body, so the skin, the airways, the gut and the microbes that live atop those areas. So, the microbiota, those good microbes, we include that in the definition of what the immune

system is. There's very few places that you'll find that don't have some kind of presence from the immune system.

(TC: 00:04:05)

Dr Hazel Wallace: Yes, absolutely and I love that, kind of, what you mentioned in the beginning, that it's not this on off switch, the way we talk about it and we often do. And obviously there are things that influence our immune system and how it functions, and I think that would be a very good place to start, kind of, what things influence it that we can control and maybe some things that we can't control.

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Dr Jenna Macciochi: Yes, so I think that's important, especially in the context of the last two years with COVID because immunity's been firmly at the top of everyone's mind and it's something that's been talked about endlessly in the media. And, you know, I guess we like to simplify things down into tangible things that we can do to have agency over our health, but part of what shapes our immune system is things that we can't control and this includes things like your genetics and also things like early life events. How you were born, where you were born in the world, your geographical location, things like gender and race. All of these play a role in a way that we can't control. Your age, although that's somewhat modifiable. And then there's all the things that we can control, so these come down to the key tenants of lifestyle, which would be, you know, what we're feeding ourselves, how we're moving our bodies, how we're managing our stress. Things that we can do to nurture our microbiota, the good microbes that live on us and in us. And how we're resting and sleeping, moving our body, things like body composition are really important because both muscle and fat are active immune organs. So having the right balance of these is really important to the overall functioning of your immune system.

(TC: 00:05:51)

Dr Hazel Wallace: Yes, I think a lot of people know that food influences their immune system, or I know that I get a lot of questions, you know, 'What can I eat to boost my immunity, what should I do to prevent a cold? And x, y and z.' But not everyone is fully aware that all these, kind of, different things that we do in our day to day lives, like how much we sleep, the stress that we're under, all of that as well, impacts our immune system.

(TC: 00:06:17)

Dr Jenna Macciochi: Yes, I often think of it as, you know, you could have this really perfect diet, super nutritious and covering all your bases. But, you know, you're very stressed because of certain life events and you're not sleeping very well and you're over exercising or under recovering and so you're missing out on all those other key inputs that the perfect diet isn't going to make up for that, magically. You know, think about having your health as a cake and you want to have that strong base from all those different, sort of, lifestyle inputs, and then all the fancy stuff and the supplements is more like the icing on the top. It's not very healthy to think about your health as a cake, but it's an analogy that works for me.

(TC: 00:06:59)

Dr Hazel Wallace: No, I do like it. So, I mean, when people do talk about boosting their immune system it's often around food and supplements. Vitamin C is the big one that comes to mind, or garlic, turmeric, there's so many. What's your take on this?

(TC: 00:07:14)

Dr Jenna Macciocchi: Yes, so I mean, I guess in my field we always say there's no scientific way that you can boost your immune system, except perhaps with a vaccine booster. So, that would be the correct way to use that term. But, we can provide it with some of these essential inputs that it needs and some of those are of course, nutritional. So, while there's a few different nutrients in foods that seem to get elevated as being really important for your immune system, I think that in the data we see time and time again that it's the overall pattern of your diet that's important. So it doesn't matter if you're eating five super foods regularly, but what are you eating across the entire week? And are you covering all your nutritional needs? Garlic, I think there's a pretty good body of evidence that it does play a role in how our immune system works to fight infection. Turmeric again, there's, like, growing evidence on it's role as an anti-inflammatory agent. Things like vitamin C is a nutrient our immune system needs in extra amounts when we're fighting an infection, but none of these are going to be some sort of magic wand on their own, if you don't have it in the right context of everything else, so are you getting enough protein? Are you eating fibre, these kinds of things.

(TC: 00:08:32)

Dr Hazel Wallace: So when you're advising someone in terms of, even though it does not exist, I'm using, like, in quotation marks, 'The best diet for your immune system,' are you just basically encouraging people to eat a healthy, balanced, Mediterranean style type diet?

(TC: 00:08:48)

Dr Jenna Macciocchi: Yes, I think what comes out on top is the anti-inflammatory diet patterns and of which the Mediterranean diet has the lion's share of the research. It's not the only anti-inflammatory diet pattern, but it's one that's very well-studied and the, kind of, key things that stand out on that is that if you're eating this way you're going to have all of your micronutrients covered. So these are the nutrients we need in small amounts, the vitamins and minerals. And I know we often think about vitamin C and zinc as being really important for the immune system, and they do play important roles, but if you're deficient in any of those micronutrients, that could impair the function of your immune system. So, it's having those micronutrients covered, but also the macronutrients. So, protein is a really important nutrient for the immune system, and actually, perhaps not so much in the UK, but worldwide, protein deficiency is one of the biggest causes of immune deficiency. So, it's a really important nutrient for our immune system, because it's the building block of all those antibodies and cells that our immune system is using when it's fighting an infection. Fats are also important, so the omega-3 fats which come from oily fish (TC 00:10:00) or you can get them from supplements. These actually make up the membranes of our immune cells and help them to function properly and move around the body properly. They are also part of switching off inflammation and resolving inflammation at the end of an infection.

And then your carbs are important too, not just for energy, and they can also be a source of micronutrients. But they can be the source of fibre which is going to feed the microbes in your gut. We have a huge amount of immune tissue located in the digestive tract, and it's up close and personal with those microbes and they

have a really close relationship in there. Those microbes are, kind of, the key educators and traders of our immune system, so we want to be fertilising them and cultivating that ecosystem inside us. And then these nutrients from the fibre are being digested by the microbes and produce our own kind of, personal pharmacy of compounds that are absorbed into the blood. They can have broad ranging effects on our immune system, so we know that eating dietary fibre and having a healthy microbiome can influence the lung immune system and how well we respond to respiratory infections, so it's not just staying in the gut. And then finally, things like the Mediterranean diet is full of different coloured fruits and vegetables, so all that fresh produce. And the pigments in these plants, called phytonutrients, of which there are many, many thousands, are, kind of, working together as a symphony to have broad-ranging effects on the immune system. They work at the genetic level, helping to switch on and off genes, and I like to call them longevity nutrients because they're, kind of, not things that we have our recommended daily amount that we need. But, the more we get the better it seems to be for our health span, so it's really building that bank account for the future.

(TC: 00:11:51)

Dr Hazel Wallace: Yes.

(TC: 00:11:52)

Dr Jenna Macciocchi: And also, calories matter. When you get a fever, you get about a 10% rise in your basal metabolic rate for every one degree that your temperature rises when you're fighting an infection. So you need to have enough calories to be able to fuel those immune responses when you need them.

(TC: 00:12:09)

Dr Hazel Wallace: Yes, which is slightly the opposite of that old wives' tale, which is, you know, feed a cold starve a fever.

(TC: 00:12:17)

Dr Jenna Macciocchi: Yes.

(TC: 00:12:18)

Dr Hazel Wallace: Do you think that we should be eating, almost, more? Or just being more conscious of the foods that we're eating when we are, you know, struggling with a fever?

(TC: 00:12:25)

Dr Jenna Macciocchi: Do you know what? There's some interesting science actually, about the old wives' tale, feed a cold starve a fever and there seems to be a kernel of truth but it depends on what type of infection you have. There were some amazing studies, they were done on mice, so we don't know that this would be the case in humans. But they found that when the mice were suffering from viral infection they did better when they were fed. But when they were suffering from a bacterial sepsis infection, they did better when they were starved. And they thought that perhaps being starved restricted the immune system from overshooting, so it, sort of, restrained the inflammation, because when the immune system overshoots as it can do, it can actually cause our bodies collateral damage. They've tried to look at how that might translate in humans with people who are suffering from sepsis, which is a life threatening condition. But, so far, I think the data has been quite mixed and I would say to anyone, you know, you probably don't know what kind of infection you have unless you're getting tested properly. So, probably just eat if you're hungry and,

you know, when you're not well your appetite may change, but as long as it's in the short term, it should be fine.

(TC: 00:14:38)

Dr Hazel Wallace: Yes, and so, kind of, thinking more broadly about, then, fasting, and our immune system, and people just kind of doing it more from a health protocol as opposed to getting a sickness. Is there any evidence to say fasting may support the immune system or the opposite even?

(TC: 00:14:58)

Dr Jenna Macciochi: There seems to be, I think we just don't know what the key duration and type of fasting would look like. It certainly seems to cause a, sort of, transient stress on the cells of the immune system and it helps to clear out the old ones and it acts on the bone marrow which is where our new immune cells are produced, so it's helping encourage fresh new cells. This also happens when we exercise as well, so it's not just from fasting. I think you just have to be careful and it might not be appropriate for everyone. It is a stress, so if you're already feeling pretty stressed it's just, sort of, adding to that life load and might be more of a negative effect. And you have to take care that you're not actually under-eating some of the key nutrients that I mentioned are important for the immune system. I'm really excited to see what comes of that field though, because I know there's a real active area of interest in the research community.

(TC: 00:15:55)

Dr Hazel Wallace: Yes, absolutely, I think like you said there, there's so many different protocols it's very very difficult to find out what's the right one for you, and, you know, there's other health implications to keep in mind as well. So, say, you've been looking after your health, you've been taking all the stuff that you've mentioned but you come down with a cold. What steps do you recommend people take to recover?

(TC: 00:16:21)

Dr Jenna Macciochi: Do you know what, I feel quite passionate about this, even before COVID, because I feel like we have this culture of presenteeism, which means we go to work even though we're not well, just because we're, like, 'Look, I'm still here.' Even though, you're like the snot monster, and you're coughing. And I kind of thought maybe that would change with COVID, because people were suddenly more vigilant and wouldn't go out if they had any symptoms of any kind of respiratory infection. But I've also been on online calls with colleagues, who have COVID, but they're, like, 'Oh I'm on Zoom, so it doesn't matter.' But I think the first to do is, you know, as I mentioned before, you have this rise in your basal metabolic rate when your body is fighting an infection. So your body is triaging energy into the immune system to allow it to do its job. So you don't want to be doing all your normal activities in your normal life, you probably just want to rest. And I think there's perhaps a case for, you know, perhaps having one day or two days of rest. Rather than just continuing as normal, maybe taking some over-the-counter pharmacy medicines to help with your symptoms, and it probably takes you longer to get well. So I'd say the first thing, is to rest, and let your body have that time to recover.

(TC: 00:17:40)

Dr Hazel Wallace: Do you offer, like, the same advice for someone with COVID?

(TC: 00:17:44)

Dr Jenna Macciochi: Oh, for sure. I think like any infection, that, you know, let your body have that time to recover and I guess if you're in quarantine you've got it forced upon you that you have to stay home and you can't go about your normal day-to-day life. The other thing to remember is that getting sick a few times a year is normal. People, we'd be going into winter and I get a lot people asking me, like, 'How can I avoid being sick? How can I get to the other side of winter without getting sick?' And I'm, like, 'Hmm, well you probably just have to retreat from the world and not see another human.' Because, germs spread where people meet. So even if you're very healthy and you take very good care of yourself, there's a high chance that you'll get a couple of minor infections a year and that's totally normal because we live in this germ world. So I always try and encourage people not to, sort of, have this fear of germs. You know, in the UK we're very lucky that we don't have some of the more sinister infectious diseases that are present in other parts of the world, or we can vaccinate for here, in the UK.

So, get your rest, don't panic, and think about your health care, get the basics in place. You know, I think there's a lot of utility in things like, nourishing soups, where you can pack in lots of yummy vegetables, but if you're not feeling well it might be a bit soothing to eat if you don't really feel like making a proper meal. And also the heat and the steam can help ease any congestion. There is some scientific evidence that chicken soup does have certain compounds in it that can help certain immune cells work better, so if that's something that you enjoy then that could be something to have. And then, staying hydrated, because if you have changes to the mucus in the nose, in the respiratory tract, obviously if you're dehydrated that can affect the consistency. It affects the mucus' ability to do its job and get rid of any microbes that are infecting you.

(TC: 00:19:43)

Dr Hazel Wallace: Amazing. And, so, no, kind of, special supplements? Focus on the low-hanging fruit first?

(TC: 00:19:50)

Dr Jenna Macciochi: Yes. Well I think so. I mean, you know, I get it, that when you take some supplements or when you buy something, you're investing in your health in that way, it gives you a sense of agency over your health. (TC 00:20:00) And you, kind of, maybe get a bit of a placebo effect because you think, 'Well, I've spent money on this, it's going to do me some good.' And it is true that our immune cells use a lot more zinc and vitamin C when they're fighting an infection, and there's some evidence that supplementing when you get the onset of symptoms may shorten the duration of the illness, but it's quite minor. So I think if you want to keep it in the cupboard, it's not something you need to take everyday and it won't prevent you from getting ill. There's another supplement called Lactoferrin, which is something that's actually found in breast milk, it's a compound we produce ourselves, at our body barriers. But they've found a way to isolate it and put it into a supplement and there's quite a lot of emerging evidence that taking that when you get sick can reduce the duration of symptoms too. So, there are things that you can do but I think if you're generally looking after yourself well, and you have that good baseline, then you should bounce back in a timely manner anyway. So, I feel like it's the little things you're doing all the time that pay off on the odd occasion that you might fall sick with something.

(TC: 00:21:12)

Dr Hazel Wallace: Yes. And like you said, it's normal to, kind of, get a cold every now and then, especially throughout the year. But, just thinking about that now, you know, recently we've come into cold and flu season, here in the UK anyway. And, there was, like, all these media reports of super colds and super flus, and people having the worst colds ever. Where do you think that's coming from? Is that just because we've, you know, had this eighteen months of really locking down and being really good with our hand hygiene and wearing masks, that we're exposing ourselves to colds and flus again or do you think we've forgotten what it's like?

(TC: 00:21:50)

Dr Jenna Macciochi: Yes, it's a really good question and I think it's quite hard to unpick exactly what is going on. I do think it depends what you did in those, sort of, almost two years, since COVID arrived, during the lockdowns. For some people the lockdowns were really stressful, and it may have really changed their diet and lifestyle habits. So they may have become more unfit and, or, had poorer dietary habits, and they might be, from an immune standpoint, in a poor situation. But for others it might have done the opposite, maybe they were getting outdoors a lot more, doing a lot more physical activity, eating better. So that's, sort of, one way to look at it. Some people might just be in a worst situation, immunologically, because of what effect lockdown had on them. There's also, you know, since the germs could not spread when we were all shut away, there's a different pattern happening of the distribution of germs and we are seeing a different shift in how that's happening. So, respiratory syncytial virus was peaking a lot quicker in the autumn and in a shorter duration of time, than what the normal pattern would be.

So then you see this real spike of young kids who can get quite sick from it in early life. Just a, kind of, different pattern than normal, it was more condensed. And that also could be that, mothers, if they've been exposed recently, will provide some immunity to their children. If the lockdown, they hadn't been exposed, then the child wouldn't have any of that maternal immunity to that particular virus. And then, you know, a lot of the viruses that cause the common cold, I mean there's hundreds of them. It's unlikely that you'll see the same one twice, but they do have a lot of cross immunity. So if you get one cold virus it might give you a little bit of cross protection to another cold virus. But if you haven't seen any cold viruses for two years, your immunity to these cold viruses drops off quite quickly anyway. So you, kind of, need that, continual exposure so that they're mild. So it could be a combination of any one of these factors that could have led to what we've seen in the last few months as we've gone into winter.

(TC: 00:24:08)

Dr Hazel Wallace: Yes, multiple things going on at once I guess. And so, you know, you mentioned that stress, and the stress of lockdown has been a big factor, and I think a lot of us when we feel a bit run down we often link it back to stress and the other things that are going on in our lives. How strong is that link between stress and us falling sick?

(TC: 00:24:31)

Dr Jenna Macciochi: Yes I think it's really emerging as one of the single, most potent contributors to ill health at the moment. I'm sure anecdotally, people would be able to relate that stress can really worsen or increase the risk of just about any health condition that you can think of, both physical and mental. And whether that stress is something that is emotional or something else, it's always a physiological response in our body and that's mediated by things like the sympathetic nervous system which is there to protect you in

the short term. So, if you're about to be hit by a bus, you need that stress chemistry to be released and motivate you to safety. Or if you have a big race coming up or a sporting event, that little bit of stress is actually very good to get you going, but I guess it can tip over into being quite detrimental quite easily. And the stress chemistry has broad physical effects on your body, to be able to provide you with that energy to get to safety or to achieve what it is you want to do. So it changes things like your blood sugar, your heart rate, your breathing and even your immune function and it sort of triages your energy away from your immune system. So it's saying, 'Well, I'm not going to fight off this cold, I'm going to use that energy to plough into the stress response because that's more immediate.' Which is fine, if it is a short term stress, but most of us in today's world experience more intermittent and prolonged stresses and we know this can be a huge detriment to immune function.

There's a really interesting study that came out very recently, that showed that chronic stress is actually accelerating our biological age. We know that ageing of our body is not always the same as our chronological age and ageing is one of the biggest risk factors for health, for infections like COVID. So they seemed to be linked to immune function, when the stress chemistry is there it's deregulating the immune system and we have raised inflammatory markers. And so we know there's this real connection and it's having these real broad effects. But I think it's just quite hard to rein it in. I mean, I am a personal stress head, I have to work really hard to manage my stress. And I think that that comes from getting support, having psychological resilience and, you know, learning different ways to regulate your emotions. It's challenging and I think something we need to be teaching our kids, probably, in school, particularly after the last couple of years.

(TC: 00:27:09)

Dr Hazel Wallace: Hi, I'm Geetha (ph 27.09), I'm a healthcare worker and my son was born safe and well a few weeks ago. I had my flu and COVID-19 booster vaccines during my pregnancy. I wanted to make sure that both baby and me were protected. Pregnant women are at greater risk of getting seriously ill with flu or COVID, which brings extra risk to baby. My advice for mums to be is, don't delay. It's easy to get vaccinated if you're pregnant. Get vaccinated or boosted now, go to [nhs.co.uk/wintervaccinations](https://www.nhs.co.uk/wintervaccinations).

(TC: 00:27:39)

Dr Hazel Wallace: Yes, I completely agree with you. It can be difficult to offer, kind of, practical solutions when a lot of the stress that occurs in our life can be external and sometimes out of our control. But I think it's useful to be aware of that and encouraging to take, you know, practical steps to reduce your stress and manage your stress where possible. And I think you, kind of, alluded to it, it is very personal and so, what's relaxing and de-stressful for one person can be stressful for another.

(TC: 00:28:10)

Dr Jenna Macciochi: Exactly. I always think there's a lot of tools and resources online, but you need to, kind of, furnish your own tool box of, what are the things that work for you? So, maybe meditation's just going to stress you out more, but maybe there's other things that you can do that are going to work. And I think, you know, there's certain things we can do in the moment, with how we breathe or going for a walk, that can really help when you have that immediate, you know, somebody sends you this email that stresses you out. But then we also have this, sort of, more future proofing stress (inaudible 28.41). So, doing activities that we enjoy, looking after our emotional and social well-being, having a network around us and these can, sort of,

buffer any future stresses as well. So I think everyone should try and explore the different tools that, you know, there's a lot of science now to support, and find the ones that are really applicable to their own lives.

(TC: 00:29:03)

Dr Hazel Wallace: Yes, I completely agree with you. And one of those things that people use to de-stress, is running. And like, there'll be people that find running, like, absolutely, so stressful, and then others who love doing it. They'll go out after a really long day of work. As someone who runs, I do find that I get an element of stress relief from it. But thinking about exercise more widely, people often say that intense exercise can actually dampen your immune system, but then, overall, long-term exercise, regular physical activity is good for our immune system. So, what's the link and how do we get that balance right?

(TC: 00:29:43)

Dr Jenna Macciocchi: Yes, I think that's a really good point, it's really interesting. There's, sort of, the older literature around exercise and the immune system that really pushed that message that too much exercise could suppress the immune system. And this was done looking at athletes who were going to events where they were (TC 00:30:00) around large numbers of people, where they can easily pick up germs. They were under a lot of stress because they were performing at an event. And they were looking in their blood and measuring the different immune cells, and what they found was that they would be more likely to pick up infections and that they would see a drop in the number of white blood cells when they measured them in their blood. But then a few decades later, we, sort of, got a bit better at measuring immune function, because not everything happens in the blood, in fact most of the interesting stuff is happening in the tissues, but that's much harder to measure in people. You don't get so many willing volunteers letting you take biopsies from all sorts of parts of their body.

But they have since shown that this drop in immune cells in the blood, in athletes, when they were attending these large events, with a large training load, those cells were actually being redistributed to those body barriers, like the skin, the lung, the gut, allowing them to perform a better, sort of, surveillance function. So in fact, it seemed to enhance the immune system, and the reason that they'd seemed to pick up more infection is probably because they were around a lot of people. But that being said, there is a tipping point, whereby some exercise tips into being too much and that seems to be when you don't properly refuel and recover. So if you're overreaching, which is pushing your body too much without the appropriate balance. Particularly refuelling with things like carbohydrates which seem to take the edge of the massive stress response that can happen from really heavy training loads. So there's definitely a point where exercise can suppress your immune system, but if you are recovering effectively and fuelling all your workouts then it shouldn't be something that's a problem.

(TC: 00:31:56)

Dr Hazel Wallace: No, I agree with you there, and I think the recovery point is really important, because, yes, we see, like, athletes when they're going through an intense training phase, sometimes they do intentionally overreach and push themselves harder. But it's that fine balance, where, sometimes it's okay to slightly push yourself harder but when you're over training and under recovering then you not only perform poorly, but then you can run into the problems of getting sick and having injuries and things like that.

(TC: 00:32:27)

Dr Jenna Macciocchi: Yes, for sure.

(TC: 00:32:28)

Dr Hazel Wallace: But I think for everyday gym goers and runners and things like that, assuming they're not going, you know, max effort everyday, exercise is going to strengthen your immune system in the long run.

(TC: 00:32:40)

Dr Jenna Macciocchi: Oh, for sure. There are so many ways in which exercise is important for immunity. Even just walking, the forces that are generated when you're doing something like walking, it's having an effect on the bone marrow which is where our new immune cells are being produced. And it's encouraging those fresh new immune cells to be set into the body, and they're going to replace the older ones that are more likely to malfunction, and this keeps our immune age young. And this is really, kind of, the crux of having a health life span, is mitigating this natural ageing which the immune system is very susceptible to. It's anti-inflammatory, you know, and muscle mass is so important. It's something I'm quite passionate about, being someone in my 40s, and I have lots of friends and people my age who I feel like, grew up in that era where you did cardio to burn calories. And nobody ever thought about protecting your muscle mass as you age but we know this is a key marker of keeping your immune system young and rejuvenated as well. And when you're working those muscles, they're also producing these myokines, these compounds that are rejuvenating the thymus gland which is a gland in the neck, that's responsible for producing our T-cells. So it keeps the thymus gland young and that starts to shrink in our 30s, and our muscles start to dwindle as well, with every decade older that we get. So that's probably my key way that I would encourage people to care for their immune system is by caring for their muscle mass on their body.

(TC: 00:34:16)

Dr Hazel Wallace: I'm absolutely behind that message, here for it. The other thing that I find can really set me off, is lack of sleep. And I know that there's really interesting research that, like, even one night of sleep can have a detrimental effect on your immune system. So I'd love to chat about that next.

(TC: 00:34:34)

Dr Jenna Macciocchi: Yes for sure, and as somebody who has suffered with insomnia in the past, I have a lot of sympathy for anyone with sleep issues because it's no joke. And it can be quite scary to know what a big impact sleep has on your well-being. And it is true that we see this drop in the function of particular cells called natural killer cells, which are, sort of, the early antiviral cells from one bad night's sleep. So it is something that we should prioritise a little bit more, I think perhaps in the world we live in, we can quite easily just say, 'Oh one more episode of Netflix, even though I am really tired.' Sort of, don't put sleep at the forefront. I think that sleep is a different phase of our immune system. During the day we're out and about, we're more likely to bump into germs, so the immune system's kind of looking out for that. Whereas at night it would be either fighting off an infection if you had one, or it would be doing more, kind of, housekeeping, maintenance and repair work. So you need to have those two divisions, because if you're only fighting

infections and not repairing, you know, then, that's not going to turn out very well in the long term. But I think it is something that we just need to prioritise.

There's also a special kind of lymphatic system that connects our brain to the rest of our body which allows us to, sort of, clear out the gunk in our brain that builds up during the day, and this is really important for our cognitive health as well. So I think there's so many levels in which sleep is important, and finding out what works for you is going to be really individual. You need to have a good sleep hygiene, the consistent routine, but we also need to be making sure we get enough daylight during the day to really set that clock ticking from the morning, to prepare for good sleep in the evening. And I think if you do have sleep problems, then it is worth going to speak to someone about it because no amount of sleep hygiene might be able to fix something that might have deeper roots and again, as I said, I've had insomnia from when my children were born due to a kind of, hyper vigilance that I developed then, so it's really something that gets support for.

(TC: 00:36:51)

Dr Hazel Wallace: Yes I think that's a really important message at the end. Because I can imagine listening to a podcast like this or conversations around sleep deprivation and health but if you're going through that period it can be quite daunting, so yes, really really important message there. I guess, to roundup, I would love to finish off with three questions that we finish with everyone. But the first one is, what is the number one takeaway you want people to take from this podcast?

(TC: 00:37:17)

Dr Jenna Macciochi: I think that consistency is key. So I've mentioned lots of different inputs that we have control over to support our immune system, but it's, kind of, doing all the little things most of the time, than doing all the things perfectly now and again. And that probably just comes from my own personal journey, that's something I've learnt, you know, going out and exploring all sorts of fancy supplements and treatments and things that are available. Actually just consistently doing all those foundational things puts you in a much better place in the long term.

(TC: 00:37:50)

Dr Hazel Wallace: Yes, I think that goes for most things in life. Consistency. And if you could go back and give your eighteen-year-old self one piece of advice, would what it be?

(TC: 00:37:59)

Dr Jenna Macciochi: I would probably have to teach my eighteen year old self to practice self compassion. This is something I only discovered much later in life, but did a lot of research about this, and about the immune system, and found that when people are taught self compassion techniques, and they control for things like self esteem, mental well-being, age, gender, body mass index, any post traumatic stress, anything, they found that self compassion could have actual tangible effects on the immune system that could be found in the blood. So, the immune system was less pro inflammatory, less unwanted inflammation, the cells were functioning better. It's quite liberating actually because it's so easy to be hard on yourself, and at the end of the day, we are just all trying our best and doing the best with what we know.

(TC: 00:38:52)

Dr Hazel Wallace: Yes. I love that, I didn't know that, but yes, that's a really good message. And then the final one is what one book would you recommend everyone reads and why? Obviously you can mention your own book, but it would be great to have another one as well.

(TC: 00:39:05)

Dr Jenna Macciochi: Yes. The one book that I read when I was writing my books that was very helpful, was *The Obstacle is the Way* by Ryan Holiday. So, he's an American guy who has, sort of, taken stoicism and made it really accessible and it's kind of discussing why, how to push through obstacles and barriers, and I think in life there's always so many obstacles to doing the things that we want to do. Yes, I found that quite, sort of, comforting, and his whole messaging around stoic philosophy was really useful.

(TC: 00:39:42)

Dr Hazel Wallace: Amazing, I need to check that one, it's good.

(TC: 00:39:45)

Dr Jenna Macciochi: Yes, it's a great one, you know, flipping an obstacle into an opportunity. And I often use bits and pieces of his, kind of, philosophy when I'm teaching students, because they're always coming at me with, 'Oh it's so hard, everything's hard,' and I'm like, 'The obstacle is the way, that's the point, like, you have to love the process, and, (talking over each other 40.06) the opportunity.' I'm not sure if I've got them on board yet, but.

(TC: 00:40:11)

Dr Hazel Wallace: Yes, and so, you do have your own book though, which is great, so if people want to find that, the book is titled Immunity, right?

(TC: 00:40:19)

Dr Jenna Macciochi: Yes, *Immunity, The Science of Staying Well*. And then the second one is coming out in February.

(TC: 00:40:25)

Dr Hazel Wallace: And what's that, what's the title of the new book?

(TC: 00:40:27)

Dr Jenna Macciochi: Oh I have to think. Build strong immunity. So the first one is, like, a voyage through your immune system and then the second one is how to develop your own blueprint for strong immunity, how to personalise everything to you. So a lot of the things we discussed today, how to find what works and doesn't work.

(TC: 00:40:48)

Dr Hazel Wallace: Amazing. Well, thank you so much for your time today. It's the perfect time of year to have this conversation.

(TC: 00:40:54)

Dr Jenna Macciochi: I know, it's been great, thank you so much for having me.

(TC: 00:40:59)

Dr Hazel Wallace: So my takeaway from the podcast is that there is really no real hierarchy of a good or bad immune system, and we all get sick sometimes, no matter how healthy we may be. Our immune system is in fact a system and not a single thing which we can switch on and off, or boost. And really, to function well, it requires balance, which we can help to support with nutrition, sleep, exercise, stress management and yes, vaccination. A little reminder that if you are enjoying the show, please consider leaving a five star rating and a review so that we can reach as many people as possible and continue bringing you podcasts. That's all from me, see you next time.