DANNY LENNON: Hana thank you so much for joining me on the podcast.

HANA KAHLEOVA: Thanks for having me, Danny.

DANNY LENNON: Before we get into some of the specific topics I wanted to talk about, can you maybe introduce people to some of your background through academia and how that's led you to where you are at the moment?

HANA KAHLEOVA: Absolutely. So my name is Hana Kahleova, I'm an endocrinologist by training, and my passion is research on plant based diets, but also meal timing and frequency for people with diabetes, for metabolic disease, and also with other health conditions, for example, rheumatoid arthritis and other health conditions that are limiting for people. I'm just super grateful whenever we're able to completely reverse the disease, when people are dropping off their medications, their high blood pressure medications and their cholesterol meds, and their diabetes medications, and I'm just super excited when I see how quickly these changes happen. Let's say you are developing diabetes for a decade or two, and then you switch to a plant based diet, you correct your meal timing

and frequency, and the changes are happening, some of them within a few days, we are able to start reducing the medications, and most changes just to happen over a course of a few weeks. So I'm always amazed by how fast these changes happen, and I'm super excited to share some of the information with our listeners today. So some of the studies have been done for people with diabetes. We've done also a few studies for weight loss. We've been looking at some mechanisms behind weight loss, such as the gut microbiome composition. We just published a paper from a randomized clinical trial that was 16 weeks long, so four months, and we were comparing a low fat vegan diet to usual standard American diet for 16 weeks. And people who switched over to a plant based diet, their gut microbiome composition completely changed within 16 weeks, like, that's pretty quick. Once you start eating all the fiber and avoid the saturated fat and cholesterol from the animal products, the changes happen pretty quickly.

So there were some dramatic changes in the gut microbiome, the most important one was on that we saw an increase in faecalibacterium prausnitzii, which is an important bacteria that feeds on fiber and produces the short chain fatty acids that have many metabolic benefits. And we know from previous studies that faecalibacterium prausnitzii is super low in people with diabetes, and the low counts have also been associated with insulin resistance and inflammation. So if we're able to increase the count of this particular bacteria, that's huge, because the increase in this bacteria has been also associated with increase in insulin sensitivity and weight loss and fat loss. So this is something that's one of the underlying mechanisms behind how plant based diet works. And in this study, we were also measuring the metabolism, and we found out that when people switch to a plant based diet, their thermic effect of food increases. That means if you eat a meal, you warm up, that's why we eat a meal when we are cold in the

winter, and it's partly due to an increase in your energy expenditure. It's called the thermic effect of food. There's an energy released in the form of heat when you eat a meal, and we found out that if you switch to a plant based diet, then this thermic effect of food will increase by about 14%, and that's why plant based diets or that's one of the mechanisms why plant based diets improve weight loss for people or help with body weight management. And apart from increasing this energy expenditure after eating a meal, we also found out that the fat inside the muscle and liver cells was diminishing. The liver fat content decreased by 34% within 16 weeks, which is amazing. Right now, fatty liver disease is one of the culprits of developing metabolic syndrome and diabetes, and there is no specific medication for this condition. So it's super important for people to know how to treat this condition with lifestyle interventions, and the plant based diet is definitely on the top of the effectiveness of lifestyle interventions, a reduction by 34% in 16 weeks is just remarkable.

DANNY LENNON: When we look at an overview of a plant based diet, and we have these various positive outcomes, one of the difficulties, I guess, is deciphering the exact mechanisms by which that happens. So even when you mentioned changes in the gut microbiome, when someone shifts to a plant based diet, we're getting a whole variety of changes in the diet, so we are not only just changing that fiber content, but probably the soluble fiber and, like you say, reducing saturated fat and a complete shift in many of these different markers. How do you go about trying to work out what is responsible for each of those?

HANA KAHLEOVA: Yeah, that's an excellent question. We are able to do regression analyses and we can tease out how much weight loss was due to change in dietary acid load, for example, or how much was due to the reduction in saturated fat and cholesterol. But these are just some

evaluations, some approximations. We cannot say with certainty that's exactly how much these have contributed to the weight loss. These are just the calculations and estimates. So once you change many factors in the diet, you can tease out these factors one by one, but a more scientific way would be to change each factor one by one. And mostly you can find also some research where, for example, they were giving people muffins, and they had the same composition, they only differed in saturated fat content. Like, fat content was the same, but in one set of muffins, they were getting more saturated fatty acids; and in the other one, polyunsaturated fats; and the researchers were looking at the effects in fatty liver, how much the fat content and deliver was changing when they changed only the composition of the fat. That's why we cannot draw any far reaching conclusions from only one study. That's why we need many research studies. Because some researchers tease these factors one by one, but then the overall change may be even bigger than the sum of these small changes. So that's where our research comes in, and our question is, okay, so if you change all, if you switch to a low-fat vegan diet, what will happen to your body. So each research study is asking different questions, and that's why we need many research studies before we offer any recommendations for people.

DANNY LENNON: On the point you mentioned around the thermic effect of food, and there was an increase, I think, you said of around 14% on the plant based diet, most of the time when we hear about TF people think of high protein intake or just a higher caloric intake is, of course, going to have higher TF, what was the reason, do we know, of why someone might see an increase in expenditure based on that thermic effect of food from a plant based diet – has any evidence pointed as to why that's the case or why we see this increased energy expenditure?

HANA KAHLEOVA: Yeah, that's a fascinating question. We've known for quite a while that plant based diets work for weight loss, and that's why we were measuring not only resting energy expenditure, but also the thermic effect of food as one of the components of energy expenditure, because the energy cannot get lost. Another part of the explanation may also be that with plant foods, we're not able to chew completely well, like, for example, it has been shown that when you eat nuts, a certain portion of energy is just excreted because you're not able to chew them that well. In contrast to processed foods, if you take the nuts and squeeze the oil out of them, all of a sudden, the energy is much more readily available. But if we encourage people to eat a whole food plant based diet, then some of the energy is being excreted, and also the digestion process will require some energy, more than for processed foods, and will also increase the energy expenditure after a meal.

DANNY LENNON: So are those differences then primarily explained by when someone does shift to a plant based diet, they typically shift to more of their intake coming from Whole Foods as opposed to ultra-processed or processed foods, that that that's the shift that's mainly responsible.

HANA KAHLEOVA: So there's two shifts. One is from an animal based diet to a plant based, so ditching dairy and meat and eggs, and switching over to whole grains and fruits and vegetables and legumes. That's one shift. And the other shift is switching from processed foods to as much unprocessed as possible. And both of these shifts have been shown beneficial. So, for example, on a Mediterranean diet, the emphasis is being placed on unprocessed foods, and this has been shown super beneficial. But are there any benefits in addition to eating unprocessed foods? Are there any additional benefits of eating plant based foods versus animal products? And that's exactly where our research comes in. We encourage people to do both shifts, because

based on the research that is available nowadays, we believe that both shifts are important in maximizing your health.

DANNY LENNON: Right. And I think this is where the conversation starts to get interesting, and that most reasonable people within nutrition, I think, would certainly agree that we want to shift people more towards minimally processed or whole food rather than processed. Where the conversation has more interesting debate, I suppose, is how far does that shift towards a completely plant based or, let's say, a whole food plant based/vegan diet need to be in order to get those health benefits. And of course, that's a very complex question, but from your perspective, based on the work you've done, and the work that you've obviously looked at, is there a distinct advantage between having a diet, let's say, that's primarily plant based, or a majority of it plant based, but including some animal products, maybe some low fat dairy or some fish, etc., versus going that complete shift over to a completely vegan diet, or even further to a low fat, whole food plant based diet from that kind of graduation, what are those distinctions that you would make, and are there clear differences in health outcomes do you feel?

HANA KAHLEOVA: Yeah, that's a great question. Most people experience an improvement in their health once they are weaning off the animal products. So if the amount of animal products, and if they're consuming unprocessed foods, they may be experiencing great benefits already. But there's also like, for example, autoimmune disease is very tightly tied to dairy consumption. So, for example, a person with rheumatoid arthritis may not experience any improvements, even after substantial reductions of dairy intake and meat intake. They may just need to be more radical. They may need to exclude all the animal products from their diet to experience a significant improvement in their health condition. So it really depends on the condition, I would like to

encourage everyone to eat, you know, to give it a try, like, experiencing themselves what a vegan diet can do for them, just for a few weeks, give it a try for three weeks, let's say, and you can find out if you will feel better or no. Most people do experience additional benefits after just excluding and eliminating all the dairy from their diet. There are so many hidden food allergies, and even, for example, asthma, and there's another, and there's just a recent paper published in JAMA on when children are introduced to dairy and cow's milk in early life, this really increases their risk of developing asthma in later years. And so many people have, for example, hay fever, and they don't know that it might be connected to dairy. And once they exclude all the dairy from their diet, all of a sudden their hay fever disappears. There's people who have a complete remission of their asthma or other autoimmune diseases, and it also may speed up the weight loss process.

So let's say, for a person who eats a pretty healthy Mediterranean diet, but they're still not losing as much weight as they would like to, and they're thinking, well, my diet is pretty healthy, why am I not losing weight. Give it a try, try a vegan diet for three weeks at least and see if your weight starts shifting more towards your goals. Sometimes the changes happen pretty quickly on a vegan diet that have been just protracted on another diet for years, but some people may experience great benefits on, let's say, a Mediterranean diet already, and in this case, they don't have to be more radical. But if you're a person who doesn't experience all the health benefits, that you would like to, if you're wondering if there's anything more, if anything more can be achieved through a diet, why don't you give a whole food plant based diet a try.

DANNY LENNON: Really there's maybe a couple of distinctions to make when we're thinking about these different dietary patterns, that one is a general health, we're trying to prevent the development of

certain chronic diseases; and for the average person, there's these different dietary patterns, whether that's a plant based diet or a Mediterranean diet, that, if they're mainly focused on whole foods, they're going to have some health benefit from that. But then there's this other category that you mentioned, maybe that we're using some of these diets, in some sense, therapeutically – that if you have a certain disorder, or you have a certain symptom that hasn't been able to clear up, potentially, there's a certain dietary approach where that's a whole food plant based diet that may be able to help with that, specifically, the things you mentioned around autoimmune disease being one. This is obviously a huge issue globally right now, and oftentimes, it's an area where there's not a lot that can be directly advised to people, and a lot of times people with an autoimmune disorder feel like there's not much direct advice that's actionable that they're being given, especially on the nutrition side where there's been so much conflicting advice. Do we have any good trials that you're aware of that are been underway or there are research groups that particularly look into this area that have investigated autoimmune diseases specifically? And if so, do we have any early findings or evidence in the area related to nutrition?

HANA KAHLEOVA: Yeah, that's a great question as well, autoimmune diseases and diet. We published two reviews on diet and asthma and also diet for rheumatoid arthritis. So we just summarized all the findings, what dietary factors play a role in autoimmune disease, is it the fat, is it the carbohydrate, what about dietary patterns, does a Mediterranean diet help, does a vegan diet help. So we completed these two reviews that have been published, and we are also finishing a randomized crossover trial for patients with rheumatoid arthritis. We're testing the effects of a vegan diet for rheumatoid arthritis. So we are literally completing the assessments this week. I hope we will be able to share the results soon.

Sometimes it's just challenging to tease out all the dietary factors that may play a role. But definitely, it seems that excluding all the potential allergens from the diet is one approach that's viable, and a vegan diet obviously excludes them, the most frequent allergens from the diet. But sometimes we need to go further. If someone has rheumatoid arthritis, and they improve on a vegan diet, but they still struggle with some pain, we may be asking for more allergens in their diet, we may be thinking about nuts and citrus fruit. And we have a whole list for people with autoimmune disease, and we encourage them to also try an elimination diet where they eliminate all the potential allergens from their diet. So it's not only a vegan diet, but also an elimination diet where for a few weeks they eliminate all the potential allergens and then they are introducing them one by one, and testing them out if they're reacting to them or no.

DANNY LENNON: One of the other questions I wanted to turn to and we've kind of alluded to it a bit already, is there's a lot of debate, particularly, within the vegan community of is there a benefit for someone going on a ultra-low fat, whole food plant based diet, as some of the people in that community may suggest – so avoiding things like extra virgin olive oil, avoiding nuts and seeds or avocado and keeping fat intake purposely very low, versus just being on a vegan diet that is based on whole foods where you can include those things like olive oil and nuts and so on. Based on your view of the current literature, do you see any potential benefit for going on those very low fat intakes, do you see reasons why or do you actually see any evidence that that is superior or not?

HANA KAHLEOVA: So based on our observations from our research studies, most people benefit from limiting their fat intake. We usually limit the fat intake in our studies to 20 to 30 grams per day, and that still allows you to eat some seeds, sprinkle your oatmeal with some nuts and seeds, it's not completely fat free. But at the

same time, it suppresses the inflammation. Like, for example, with auto immune disease, it seems that a lower fat content in the diet really helps with inflammation, and also the proportions of the fats that we're consuming. So if you're consuming flaxseed, that's much better than consuming coconut oil, for example. So it's not only about the quantities, it's also about the quality. And we know that once we start limiting the added oils, for example, and we increase the consumption of green leafy vegetables – green leafy vegetables are super high in omega 3 fatty acids, which the fat content is super low, but the proportion of omega 3s in green leafy vegetables is super high. So if we limit the consumption of added oils, what happens is that we actually improve the overall composition of the fatty acids in our overall diet, instead of consuming a lot of omega 6s, we start consuming more of omega 3s.

DANNY LENNON: In this area where we are now and with so much interest in plant based diets, and obviously, you've been very prolific in your publications, over the next number of years, what do you see as the big research questions that are still unanswered as of yet or that you think would be a really good avenue of research for people to explore either your group or others? What are those big research questions that you hope the next couple of years of research will shed light on?

HANA KAHLEOVA: Yeah, that's an excellent question. We have quite a few areas we would like to tap into. One of them is plant based diets for kidney disease. For example, are we able to slow down the progression toward dialysis in a person with a compromised kidney function? That would be a huge one. Also important for our healthcare system. It would save so much money in our healthcare system. Another one would be heart failure. There's a few case studies showing great benefits of a plant based diet for heart failure. But there has not been done a randomized clinical trial exploring this. And

again, heart failure, that's a big cost in our healthcare system. So that's potentially a super important study. Another one would be a study for patients with asthma, especially children with asthma. So we know that exposure to a cow's milk in early life increases their risk of developing asthma. But can we, if we wean them off the cow's milk and of all the dairy products, can we actually improve their symptoms significantly on a plant based diet? That would be a big question too. So these are just a few glimpses of the studies that we would love to conduct, and that we found super important as topics.

DANNY LENNON: If we shift our focus to another area that you've published on and probably where I first came across your work was in relation to meal timing. And as many of our regular listeners will know that it's something that we've talked about quite a bit on the podcast and have a keen interest in. So in relation to your work, maybe first give people an overview of some of those research questions that you've tackled, related to meal timing, and maybe an overview of some of the main findings from your work.

HANA KAHLEOVA: Yeah, this is a fascinating area of research. So my first study on meal timing and frequency was in 2013, when we published a study in patients with type 2 diabetes. At that time, it was really recommended to people with diabetes to snack a lot and eat many small meals a day. So we compared the usual snacking model, six small meals a day, with eating only two meals a day, breakfast and lunch, with the same amount of calories, with the same diet composition, and each intervention lasted 12 weeks, three months. And it was a crossover trial, so the participants tried both, and they were able to compare not only – we were not only able to compare for the whole group, but each participant was able to compare for themselves what works better, and the findings were pretty fascinating. People or diabetics were losing more weight. Their fasting plasma glucose improved more on two

meals a day. Also, their insulin sensitivity went up more on two meals a day. Their liver fat went down more on two meals a day. Also, they were reporting less depression symptoms on two meals a day, and their quality of life improved more on two meals a day. So taken together, most participants were actually surprised by the findings. At the end of the study, most of our study participants decided to stick to the two meals a day plan because it was working well for them. Most of them were kind of hesitant to join the study in the beginning. They were like I'd love to give it a try, but I'm afraid, I will not be able to do it. Eating two meals a day, I will probably be hungry in the evening. That was something that we had to tackle within the first few days. It usually takes only three to four days to adapt to the new regimen.

So once people were able to figure it out how to eat a big enough breakfast and lunch not to get hungry in the evening, they started loving it. It's less work to prepare only two meals a day. You need to worry only about two meals a day versus six, which is huge. What should I eat for my snack today, I'm running out of ideas, I had carrots yesterday. So eating two meals a day until you're full actually satisfies your hunger, and so feelings of hunger were less expressed on two meals a day, which was also a surprising finding, which means eating until you're full, even though it's only two times a day, seems to be working well versus eating six small meals a day where you never get full, because you're limiting your calorie intake, so you're basically hungry the whole day. And I also conducted another study at Loma Linda University analyzing the data for more than 50,000 people, and we were looking at meal timing and frequency and how they were gaining weight over the follow up of seven years. And we found out that the more meals per day people were eating, there was a linear relationship, the more they were gaining weight. So if they were snacking, they were definitely gaining weight compared to eating

only three meals a day. And people who are eating two meals a day were better off than those eating three meals a day. And also the longer the night fast, the better for weight management. And another big factor was eating breakfast, particularly, making breakfast the biggest meal of the day. Eat breakfast like a king, lunch like a prince, and dinner as a pauper. So that's exactly we confirmed the findings of this ancient proverb. It's pretty amazing how our ancestors were wise without any scientific knowledge, but they somehow had the wisdom.

DANNY LENNON: Yeah, and I think it was around a similar time, it could have been Daniela Jakubowicz was the lead author on a paper very similar of showing that a large meal versus the smaller dinner was more beneficial for weight loss and these metabolic markers versus the opposite. So I think, yeah, it's interesting to note that, particularly now with the interest in time restricted eating that people have, that maybe more of the focus needs to come from not just looking at the length of time of that feeding window, but where in that feeding window you're placing the bulk of your calories. Because as you suggest from your work and also from Daniela Jakubowicz's work, it would suggest that there's potentially a benefit to shifting more of that calorie distribution earlier, which I think a lot of those chrono-nutrition research groups are kind of focusing on now. So it's interesting to see it kind of fitting together in that way.

HANA KAHLEOVA: Absolutely. It's fascinating. Like, within a few years, we see a major shift. When I was presenting my work on two meals a day for people with diabetes, I was isolated and alone. People were skeptical. They were like, this cannot work, people have to be hungry in the evening. And now there's a major shift towards the early time restricted feeding. So really amazing how fast things are changing.

DANNY LENNON: Yeah. And from practice, and kind of some anecdote, you mentioned there about the kind of adaptation for a few days that people have to a new pattern of eating, and particularly, with their hunger and adapting to having these larger meals earlier. Because I've seen that as well, both myself and others, that typically think of, oh, I prefer saving more of my food for later in the day, because I'm always hungry there, I'm not so hungry in the morning. But really not realizing that's just a learned pattern. And if you shift to that more of those calories earlier, and then not having that large meal in the evening, after, like you say, a couple of days, that adaptation does kick in and you find, oh, surprise, surprise, I'm not really hungry at night, because I've had my calories earlier. And I think sometimes it's a psychological block that people think they won't be able to do, but they just need a few days' adaptation.

HANA KAHLEOVA: Yeah, absolutely, I agree. Most people will find it so invigorating. Once you stop eating in the evening, your sleep improves, you have more energy, you look forward to eating your breakfast. There's just like a major shift. So I would like to encourage people just to give it a try for a few weeks, how it feels.

DANNY LENNON: I'll ask you a similar question that I did related to plant based diets, in that, in this area related to calorie distribution across the day, timing of meals over the next number of years – what do you think are maybe some research questions that would be interesting for more research to shed some light on?

HANA KAHLEOVA: Absolutely. This is a fascinating area, and most of the studies have focused on weight loss and the benefits of intermittent fasting on weight loss. However, what are the benefits for other health conditions, like, auto immune disease? We know fasting can be pretty effective for autoimmune disease. How about combining a plant based diet and intermittent fasting? Would that help? Would that provide any additional benefits? And other health

conditions as well, it has been, for example, shown that fasting may decrease blood pressure in people who have hypertension more effectively than diet alone. So again, would these people benefit from combining a plant based diet with intermittent fasting, eating, for example, only two meals a day more than just from a plant based diet alone? These are just like fascinating questions, and I would love to see some research coming out.

DANNY LENNON: Before I get to our final question, for people who want to hear more about the work you're doing, get more of your information, find you on the internet, where some of the best places you'd like to direct their attention?

HANA KAHLEOVA: People are welcome to direct their patients or check out our website at pcrm.org and check out our 21-day vegan kickstart. So if you're new to a plant based diet, or if you would like to recommend a vegan diet to some of your patients, this is a free guide that will just help you with the recipes, what do you eat when you go vegan, what are healthy vegan recipes. We also have an overview of the research studies that have been published on our website. So you're welcome to check out different conditions like diabetes and asthma and rheumatoid arthritis, and you will find all the research studies that have been published on nutrition and these conditions. I would also like to share something with our listeners today, and I will provide some free videos that they can watch on meal timing and frequency.

DANNY LENNON: And for everyone listening, I will link up to all of that in the show notes of this episode. So with that, that comes to the final question I always end the podcast on, but it's simply: if you could advise people to do one thing each day that would have a positive have impact on any area of their life, what might that one thing be?

HANA KAHLEOVA: Be grateful. Be grateful for everything that has happened in your life which allowed you to be

in a place where you are right now. Be grateful for the present moment and be grateful for the opportunities that lie in the future. Have open eyes with gratefulness in heart. Have open eyes, what's the next step that you can take to improve your health, improve your relationships and just improve the lives of people around you.

DANNY LENNON: Wonderful. A great message and a perfect way to end this podcast. So let me say thank you so much, Hana, for taking the time out to talk to me about your work.

HANA KAHLEOVA: Thank you so much for your work, Danny. It's so important that people hear about the research that is coming out, and thank you so much for spreading the word and for keeping people informed. Thank you.