

# When Science Finds a Way

## Season 4, Episode 5

### Does the food we eat improve our mental health?

#### Show notes

##### Episode description:

We know that the food we eat affects us physically, but how might our diets help or hinder mental health? Dr Wolfgang Marx tells Alisha Wainwright about his work to find a link between mental health and diet. We also hear from Dr Iain Campbell, who found that a famous diet helped his own bipolar symptoms, inspiring him to work on a new large-scale trial. And Dr Sheri Johnson explains why we should explore not just what we eat, but when.

##### Mentioned in this episode and further reading:

- Food and mood centre, a multi-disciplinary research centre that aims to understand the complex ways in which what we eat influences our brain, mood, and mental health, Deakin University (<https://foodandmoodcentre.com.au/>)
- Time-restricted eating as an adjunctive intervention for bipolar disorder – Wellcome funding award (<https://wellcome.org/research-funding/funding-portfolio/funded-grants/time-restricted-eating-adjunctive-intervention>)
- Personal keto journey leads to career in research: Iain Campbell's story (<https://www.metabolicmind.org/thinksmart/explore-strategies/iain-campbell/>)

#### Transcript

[00:00:00] **Wolf Marx:** Diet is really an interesting example of, you know, the mind-body connection. If we can prove the health of our body, it's also improving the health of our mental wellbeing and our brain health.

[00:00:16] **Alisha Wainwright:** Welcome to When Science Finds A Way, a podcast about the science changing the world. I'm Alicia Wainwright, and on this series I'm talking to the global experts who are making a difference, as well as the people who have inspired and contributed to their work.

Now, it's obvious that the food you eat has a big influence on your physical health. In this episode, we're going to talk about something that's less widely understood: how diet could impact your mental health. This is the question, driving an emerging field, nutritional psychiatry. Nutritional psychiatry is the evidence-backed investigation of how the food we eat affects our mental and brain health.

This is not about fad diets, and it's not really about general mental health wellbeing either. As we'll hear, there is promising evidence from multiple small scale pilot studies about how diets

could work in combination with other treatments as effective interventions for a range of diagnosed mental health conditions.

Now the field is ready to test this hypothesis in larger trials. Joining me to discuss this area of research is Dr. Wolfgang Marx. He's Senior Research Fellow and Deputy Director of Deakin University's Food and Mood Centre. In this episode, we'll get an idea of the breadth of nutritional psychiatry and discuss two research projects, looking at how two different diets could help to reduce the symptoms of bipolar disorder.

We'll also hear how the lived experience of patient communities and the questions of implementation and personalization are incorporated in this field. So let's get into it.

[00:02:03] **Alisha Wainwright:** So when we think about food and mood, you know, I think about the old saying, "you are what you eat". But I wonder how true that is when it comes to our mood and mental health. What do you say to that?

[00:02:18] **Wolf Marx:** Yeah, I think there's some truth to that. I mean, it's an old saying, and I think when you look really at any culture, across time, there's this understanding, or this sort of intuitive understanding that what we eat is linked somehow to our physical health, but also our wellbeing, how we feel.

And I think even, as individuals, we think, well, that time where I perhaps hadn't been eating so well, I feel a little bit lethargic, a little bit fatigued, I'm not quite on as I usually am, and there's times when I've been eating really well and I've been eating really healthy, I feel a little bit sharper, I feel a little bit better in myself, but I think what's new is that we've added that scientific method to interrogate this intuition, this feeling, to determine, well, is that actually true? And if it's true, what's going on? Why is that true? And how true is it? You know, is it a small effect? Is it a large effect? These are all the things that have been happening in the field of nutritional psychiatry, probably within the last 10 odd years.

[00:03:30] **Alisha Wainwright:** I wanna talk about, how does diet impact our mental health? What are the mechanisms and what do we know so far and what are you most curious about?

[00:03:43] **Wolf Marx:** I guess there's sort of three layers or three sort of converging pathways, as I sort of see it.

The first one is the biological mechanisms, related to diet and mental health. And so by that I mean diet has, you know, there's substantial literature showing that various components of the diet, things like Omega-3 fatty acids, polyphenols, dietary fibre, various nutrients, vitamins, minerals, all have a role in reducing inflammation, improving our antioxidant defenses, interacting with our gut microbiome, you know, all these sorts of various pathways that we are now understanding are also linked to our mental health. But then in addition to that, I think two other areas that perhaps don't receive as much attention is the effect of diet on metabolic health. So, we know that areas like insulin resistance, obesity, cardiovascular disease, all the rest are highly comorbid in people with mental disorders, and that the dysfunction that's caused by these diseases can interrupt and have a negative effect on the various mechanisms related to our mental health as well. So by eating better, by reducing

our risk of these various cardiometabolic disorders, I see this as a pathway of also improving our mental health.

Diet is really an interesting example of, you know, the mind body connection. If we can prove the health of our body, it's also improving the health of our mental wellbeing and our brain health.

And then the final area is around that behavioral and psychosocial sort of mechanism. So, you know, food isn't like a medication or, you know, food is quite unique in that it's not just fuel, it's, you know, it's identity, it's culture, it's celebration, it's routine, it's politics, it's environment...

[00:05:57] **Alisha Wainwright:** It's not like brushing your teeth. It's something that, it happens in front of other people sometimes.

[00:06:04] **Wolf Marx:** Yeah. And so, you know, the psychosocial components of sitting down with friends and family to eat, to the skill-building that comes with, you know, trying new recipes, the flavors that give pleasure. All these sort of psychosocial mechanisms I think sometimes get sidelined because everyone's like, ooh, gut microbiome, how interesting. But, you know, these are really important, parts of the human experience of eating good food with people. And I think that has a strong effect on how food can help our elemental wellbeing as well.

[00:06:45] **Alisha Wainwright:** So when you work with the Food and Mood Centre, I wonder if you can describe what you do, but also how it relates to the way maybe the average person thinks about food and food consumption, diet, you know, things like that.

[00:07:04] **Wolf Marx:** Yeah. So I guess, as the name suggests, our primary, focus is the relationship between the food that we eat and our mood, our mental health...

[00:07:41] **Alisha Wainwright:** (laughs) Right on the nose!

But, we run a diverse clinical trial platform. We ran the first randomized controlled trial that looked at a dietary intervention for major depressive disorder and people with clinical diagnosis of major depressive disorder. We've also looked at various sort of real world studies, so trying to move beyond that very tightly controlled environment of a clinical trial to see how these approaches actually work in the real world setting. And then the other pillar of our centre is really around that education and implementation because, you know, there's all sorts of misinformation, as you were saying, there's all sorts of conflicting research messaging, particularly within social media. We want to not just publish papers so that it's within the academic sphere. We want to actually bring our research, the people that are interested, the people that need it. And so we've developed quite a broad research and education program so that people can download and access this information in a way that cuts through the jargon and gets to the meat of the information that people need.

[00:08:33] **Alisha Wainwright:** So I wanna talk about the SMILE study. Can you tell me about the SMILE study?

[00:08:38] **Wolf Marx:** This was essentially the first randomized controlled trial to investigate whether a dietary intervention might improve or reduce depressive symptoms in people with a clinical diagnosis of major depressive disorder. So this was a randomized controlled trial. It was in 67 adults with a clinical diagnosis of major depressive disorder as well as a low diet quality score, so they weren't eating a nutrient-dense diet. When they entered the trial and they were randomized to two different treatment arms, they either received a Mediterranean dietary intervention - so this is a dietary intervention that focused on nutrient-dense, plant-based foods, consumption of extra virgin olive oil, increased intake of fish, reduction of processed meats, sweets, sugar sweetened beverages, those highly refined sugars and all the rest of it - and the other group received a social support control intervention.

So this was essentially an intervention that was matched for how often we were meeting with the participants, but it was really just sitting down, having a chat with them and talking about anything other than diet. So this was the control condition. I do wanna emphasize though, with the intervention, it wasn't, "alright, this is what a Mediterranean diet is, off you go, tell us how you'll go in 12 weeks." This was an intervention where we met with them once per week with a trained dietician. We provided nutritional education, but it was also around meal planning, budgeting, various recipes, shopping, you know, all these sorts of things that come into that general health literacy to improve our understanding of how do we actually incorporate these foods into our diet?

What we found was that at the end of those 12 weeks, we found a dramatic reduction in depressive symptoms in people that received that dietary intervention arm, so much so that 32% of those that went onto the dietary intervention arm, achieved what we call remission criteria. So they were no longer meeting that clinical cutoff of what one would consider major depressive disorder. And that was compared to the control condition where we didn't see that same effect. And so it was quite a dramatic improvement. And what's really encouraging is since then, because this was published some years ago now, there's been a number of independent research groups across, both within Australia and across the globe, that have replicated these results in their own populations as well.

[00:11:37] **Alisha Wainwright:** When we think about diet as a tool for helping with a clinical diagnosis, improving symptoms and things like that. We're not necessarily talking about diet exclusively, right? We're talking about it in conjunction with medications or behavioral changes, or maybe you can shed some light on, in addition to a diet, what else are we looking at when we think about a clinical diagnosis?

[00:12:05] **Wolf Marx:** Yes, a crucial point, which is that our research isn't aiming to replace, you know, evidence-based interventions, antidepressants, pharmacotherapy, psychotherapy, physical activity, all the rest of it. We see this as an adjunct, a combination approach. It's essentially an additional evidence-based approach that can be used in combination with other evidence-based approaches that is tailored to the individual's circumstance. And so we've produced clinical guidelines where we show how dietary interventions can be implemented into clinical care based on treatment, as well as the severity of symptoms that are being seen by the individual. And indeed, in our randomized controlled trials, such as the SMILE trial, this wasn't a dietary intervention in place of, you know, standard care. This was a dietary intervention that was added on top of the antidepressant and psychotherapy that the participants are receiving. So it's very much a combination with everything else that we know works.

[00:13:26] **Alisha Wainwright:** To get some insight into the other research driving this field we spoke to Dr. Iain Campbell from the University of Edinburgh. He has a very unique perspective on this. As both a researcher and someone with lived experience of bipolar disorder, Iain discovered by accident that following a ketogenic or keto diet helped with his bipolar symptoms. This led to him researching the history of keto diets and eventually to a pilot study testing their impact on bipolar disorder when used in combination with other treatments.

[00:13:58] **Iain Campbell:** I really stumbled on the ketogenic diet by accident.

I was trying to lose weight and I went on a low carbohydrate diet for weight loss. And I had periods during this time when, for the first time in my life I'd experienced these states of calm and clarity of thought and mood regulation that I never experienced before. And it really came down to this dietary change I thought might be having an impact.

And I learned that this diet essentially induces periods of ketosis. I was following a kind of mild form of ketogenic diet, and the main adaptation is removing the refined carbohydrates and increasing the fat intake. And this is a treatment that's been used in epilepsy for seizure reduction for over a hundred years.

There's over 13 randomized controlled trials and a Cochrane review of the effectiveness of ketogenic diet, as a seizure reduction tool in epilepsy. And this is of particular interest to the bipolar community because we're treated by many anti-seizure medications, medications that came from epilepsy, such as carbamazepine, lamotrigine valproate. So this became much more interesting to me then, 'cause I could see the link between the current treatment strategies. And this was the basis of our research, was then trying to understand could this be beneficial for other people and could this potentially be a treatment for bipolar? So we did a pilot study with 27 participants, and it was a very long journey to get to this pilot study, and a lot of patient effort and advocacy to raise awareness about this, to make it a serious research priority.

And so we also have to be, you know, humble with what we can say from a pilot study of 27 patients, but it did have very promising indications. We saw significant weight reduction across the participants, 4.7 kilograms on average. And significant reductions in systolic blood pressure, which are indications of positive, physical health effects.

But we also saw a correlation, between ketone levels and improved, daily mood outcomes and anxiety outcomes in patients. They were measuring their mood and anxiety daily and tracking these against ketone levels. So the next stage is essentially RCTs, brain imaging studies and trying to look at, what patients might benefit from this.

[00:16:05] **Alisha Wainwright:** I want to know if you could just sort of expand on what is the keto diet, and how does ketosis help mental health?

[00:16:16] **Wolf Marx:** So essentially what a ketogenic diet is, is a diet where you restrict the level of carbohydrates that you consume to quite low levels. So its various grams sort of differ, but it's somewhere around less than 50 grams per day. And if we think about, you know, what you might have during a typical sort of western diet that is quite low.

[00:16:47] **Alisha Wainwright:** It's like a slice of toast, right?

[00:16:48] **Wolf Marx:** People might have more than 50 grams or around 50 grams in their cereal for breakfast. So yeah, it's definitely a lot lower than what many people might be used to.

But the reason why people, or why this ketogenic diet, restricts carbohydrates is because when your body doesn't get that energy source from carbohydrates, it starts to look around for another energy source because our body is amazing and very adaptable and, and all the rest of it.

And what it shifts to is these ketone bodies. So it's essentially a shift from our body using glucose as our primary energy source to using ketones, which is a set of compounds that are primarily derived from our fat sources, that we eat from our diet. So if I sort of step back a little bit, in mental disorders, we see from neuroimaging studies, from metabolic studies, from biomarker studies that there seems to be differences in our metabolism, our energy metabolism. So the mitochondria, at least in some people with mental disorders, doesn't behave the same way as what happens in people with, without a diagnosis.

And so the theory is if we can move to an alternative energy source that doesn't go through these same pathways, we might kind of sidestep some of these abnormalities and be able to provide our brain cells with the energy that it needs, compared to, when it's based primarily on glucose where it's not really getting the fuel that it needs directly.

I will say, I think, you know, Iain said it well, is that right now there's this sort of preclinical research. There's some pilot studies. There's a lot of very interesting published case studies and case reports and, and the rest. But we don't have that high quality, randomized controlled trial evidence to say which way this is happening, if this is happening. But we are at that precipice where I know of several, probably half a dozen randomized controlled trials are being run by various independent organizations all over the world. Some of them are pretty well progressed. And so I think, you know, perhaps even later this year, and certainly over the next couple of years, we're gonna have some really interesting trial data.

But right now it's something that's a very interesting, exciting hypothesis, with, good evidence to say there's something happening here, but I don't think we're really at that level where we can say, yes, absolutely, this will help. These are unanswered questions right now.

[00:19:44] **Alisha Wainwright:** I also just love whenever I hear of a study being led by someone who has lived experience with the condition that's being researched and I think that Iain is such a fantastic example of how you can use your own life experience to offer insight into your clinical research. I do wonder what is the risk of doing a ketogenic diet and, and what should people consider if they're considering it at all?

[00:20:16] **Wolf Marx:** I suppose before we get into the potential risks and considerations with this diet, I do want to emphasize that this is largely being investigated as a therapeutic diet for people with a clinical diagnosis.

I don't think there's much compelling data to say that we all need to move to a keto diet for general wellbeing and the rest of it. This isn't something for prevention or for people without

a clinical diagnosis. I think if we see a therapeutic benefit, it will be for people with, you know, a clinical diagnosis where the biological mechanisms and all the rest that we've discussed are, you know, perhaps, altered compared to people without a clinical diagnosis. So I think that's sort of an important thing to emphasize. In terms of the medical considerations, I think two areas with particular considerations that can be managed is, one: if you switch to a high saturated fat version of a ketogenic diet, there is a risk that your cholesterol levels, you know, get all outta whack. Your LDL, you know, sort of bad cholesterol starts to rise. And so I think that is particularly where, you know, medical supervision will be helpful, to help sort of guide that to ensure that your lipid levels aren't being elevated and that if they are...

[00:21:57] **Alisha Wainwright:** With all of your bunless cheeseburgers, right?

[00:22:00] **Wolf Marx:** Yeah, exactly. Exactly. And I think that's really where, you know, that dietary education also comes into it. There are various flavors of, of ketogenic diet. You know, there is vegan, there is vegetarian, there are whole food versions of ketogenic diets, that can mitigate some of these risks.

But if you go on it and it's primarily meat and high saturated fat and all the rest of it, then I think there's a risk that you might be increasing your cholesterol levels, which has long-term cardiovascular risks associated with that.

The other area is around fiber and constipation. So again, if you move on to a ketogenic diet where you are cutting out grains, which are, you know, a decent source of insoluble fibre, you're cutting out fruits, which, again, great source of fibre. There's a risk of constipation, again, that can be managed with proper dietary education and planning. But it's just something to be aware of.

And then I think the other area that I think needs to be managed, and again, leads to that importance of that medical supervision, is that with any restrictive diet, not just ketogenic diet, but any type of significant dietary change, there is that risk of disordered eating behavior either being, revealed or exacerbated.

And so I think, we don't want a therapeutic diet causing distress. And so that sort of needs to be managed as well because I think it's very easy to get into that sort of mindset of "carbs equals bad", and, and, and all the rest of it. So I think that disordered eating is something that really needs to be managed closely and particularly, I say that in light of our recent clinical trials where we have actually been formally screening for disordered eating in our dietary interventions, and we see really substantial levels of possible indicators for eating disorders and disordered eating. So it's not something that is a niche problem. It's something that can be quite widespread. And so, yeah, again, it just needs to be managed.

[00:24:28] **Alisha Wainwright:** So the keto diet is just one example of a diet being examined for its potential use as an intervention for diagnosed mental health conditions. To get a sense of the different approaches in nutritional psychiatry, we spoke to Professor Sheri Johnson. Sheri is a psychologist and Chancellor's Professor at UC Berkeley. Like Ian, she's been leading a research project looking at diet's effect on the symptoms of bipolar disorder. But this project, called Healthy Lifestyles of Bipolar Disorder, is examining a totally different mechanism: how time restricted eating could be used in combination with existing

treatments to help reset the body clock in people with bipolar. She told us about the idea behind this mechanism and how the study is focused on real world implementation.

[00:25:22] **Sheri Johnson:** People with bipolar disorder often struggle with something called circadian rhythms. Really what that means is day night rhythms. Many times people with bipolar disorder can feel very sluggish by day, and then they're more awake than other people are at night. So we think that circadian rhythms are part and parcel of what's going awry for many people with bipolar disorder, that maybe if we can improve those circadian rhythms, we can make a difference in the disorder and the outcomes.

All of us have a clock in our brains. We have something called the schematic nucleus, and it's a timekeeper in your brain that sends signals out across your body, and the schematic nucleus responds to specific cues of light at dawn and dusk when a person is outside. So we've known that, and scientists have been using light exposure at critical periods of day, using the same frequency of light that you get at dawn and dusk to help people improve their circadian rhythms for a long time. What we got excited about is research coming out of Satchin Panda's work at Salk Institute, showing that just as powerful as light was when you fed an animal. If you feed an animal during their most active period, you can strengthen the animal's circadian rhythms. And he was able to show that that was great for the animal's metabolic health. Many other people around the world began to work on clinical trials with humans to say, hey, could the timing of eating help people's metabolic health and their sleep patterns? Nobody had done that in bipolar disorder, and that's what we wanted to do, is to say, can we help people adjust the timing of their eating, follow the kind of most active period of their day, and see if that improves circadian rhythms for people with bipolar disorder?

There are a lot of versions of time-restricted eating, and it's kind of part of a broader family called intermittent fasting. We are using a really specific version of this though. We wanna make sure that people just basically eat during their 10 most active hours. So wait an hour or so after you wake up to have your first calories, and then a couple hours before you go to sleep, quit the eating. No midnight snacks. In our study worldwide, we'll give people tools and support and coaching to shift to a time-restricted eating, and we'll look to see if we're making a difference in symptoms. We can actually measure the activity of clock genes in their body throughout the course of a day by just swabbing their cheek, and getting some clock gene kind of data. And we'll be able to see if we're making a difference in clock gene expression and see a much more regular biological rhythm, day night rhythm, for people as they follow the time-restricted eating.

I think when it comes to diet and bipolar disorder, we definitely need randomized control trials. We need to understand mechanisms because that'll sometimes help us be even more refined about the diets. But there's another whole piece of this, which is to test, how well does it work in the hands of real life human beings? How hard is it to pull off? What do we need to shift to make it feasible for people? Who's gonna find it easier to kind of follow a diet? Who's gonna find it harder? What kinds of support do we need to give them? So I think there's a whole set of things about, how acceptable it is, how feasible it is, what kind of context of support we have to give people.

[00:29:13] **Alisha Wainwright:** Wow. Sheri's note about how does this work in real life human beings, I think is a really tricky question because you can compile a lot of research, but this has to be implemented in your average person experiencing, in this instance, bipolar

disorder. So how do you do that? How do you take this evidence that you've learned and implement that in a real life human being?

[00:29:49] **Wolf Marx:** Yeah. So I guess as we've sort of said along the podcast, that is where the importance of individualization comes in. And I think Sheri and I have obviously been sharing notes or something because I feel like a lot of what she said rings true to a lot of the work that we are doing.

I think it's not enough just to say, all right, well this works in the confines of a randomized controlled trial. It's also about, well, how is it implemented in a sustainable and, and feasible way? And so I think the first part of that is, providing that individualized approach, meeting people where they are.

And this is, you know, in terms of food preferences, in terms of the social, and functional considerations like, you know, with time-restricted eating, if you are eating out or preparing meals for kids and all the rest of it, it might be somewhat hard to sustain that diet when you are working within a situation with family and friends and all the rest of it, that aren't adhering to that same sort of time restricted window. So, you know, strategies for managing these sorts of things, food preferences, all the rest of it.

I think another important consideration, more sort of at a high level is around equity. We know that people with mental disorders experience a substantially higher risk of food insecurity compared to the general public. And so I think when we're recommending diets and dietary prescriptions, we need to ensure that these food, these diets, these food ingredients are accessible, are affordable, you know, that they can be, delivered in a way that's sustainable.

And within the consideration of food insecurity, the other thing that researchers need to do more of is around that implementation and sort of real world trial design. And this is something where we've moved into where instead of that sort of highly rigorous or highly refined randomized controlled trial, we're moving to those more sort of real world trials where we look at what is the effect of these studies of this dietary intervention, within a population that has all sorts of comorbidities that may not fit that perfect clinical diagnosis, delivered as part of primary care or secondary care, you know, within the medical system, so we can get that better understanding of how does this actually implement into the real world setting. And then I think the final area is around training and mental health system integration. We really need a skilled clinical workforce, and system referral pathways, and dietician and allied health support integrated within psychiatric care so that people with these mental disorders can receive that support, and it's not just left up to them.

[00:33:22] **Alisha Wainwright:** Nutritional psychiatry is still an emerging field. Iain Campbell told us about plans to expand his team's pilot study into a large scale randomized control trial, comparing the ketogenic diet with the Eat Well Diet, recommended by the National Health Service in the UK, and looking at the effect on bipolar symptoms.

Iain spoke about integrating the experience of patient communities who have already experimented with different diets to help ease their symptoms.

[00:33:53] **Iain Campbell:** So we're looking to recruit 206 patients. 103 will be on the ketogenic diet, and 103 will be on the NHS Eat well diet, which is a kind of way of comparing the two diets to see, is the effect of ketogenic diet uniquely beneficial or detrimental to people with bipolar disorder? And this is the largest study in the field to date, which is a kind of very robust way of trying to assess the effects of a ketogenic diet versus a kind of standard dietary pattern in people with bipolar.

So we'll look at glucose levels, ketone levels, and biomarkers that might be associated with a change in energy status in the body.

Again, in metabolic psychiatry, when you're looking at how energy and metabolism function, one of the most fundamental interventions you can make is to change the fuel source of the brain. It's like if you had a car that has a diesel engine and an electric engine, and if the diesel engine is malfunctioning, going into states of overdrive and sort of depressed function, perhaps you can change over to an alternative fuel source, and this would be beneficial.

So we want to capture both the quantitative measures of mood assessment, and we're also interested in interviewing patients and asking them about their lived experience of this intervention. So the objective measures are very helpful in psychiatry and quantifying the change in psychiatric mood scores.

Also we want to understand as a patient, as a human being, what is their experience of life on this intervention? Does it improve their quality of life and their kind of capacity to function and to really thrive as opposed to just getting by? So there'll be a mix of primary measures, quantitative measures like the PHQ nine score, but we'll also interview patients, to try and understand their experience.

I think that lived experience and science research really go hand in hand in many major breakthroughs in science or advancements in treatment and care. You can see this in the application of ketogenic diet to epilepsy. It was initially families whose children had epilepsy, adhering to this ketogenic diet and reporting the effects as large patient communities that raised awareness about this and made it a mainstream treatment for epilepsy. And this is kind of the unique aspect of metabolic psychiatry. It's not coming from just a kind of conceptual idea or abstraction. It's really coming from real patients who are sharing their experience on blogs, YouTube channels, podcasts, case reports, case series, and now in clinical trials as well.

So in the RCT we'll have a patient advisory group that's guiding the research and informing all aspects of the trial design and delivery. And this really anchors the research in real patient experiences and their lives and their quality of life and what their family expect from them, thriving and really finding treatment that really helps them to live a full life, not just surviving.

I think this is the real value of it. It connects the map to the territory in a sense where you really have this, rooting in the real experience of patients, and this has to be beneficial for them to be successful.

[00:36:53] **Wolf Marx:** I absolutely agree with Ian's perspective, which is that a lot of the great scientific discoveries, you know, not just within psychiatry, but in medicine in general, come from anecdotes, from chance discoveries and, and all the rest of it.

And so I really encourage researchers and clinicians to treat that with the respect and care that it deserves. I think it's something that, you know, every research question starts from an idea, a hypothesis, something, and you follow that lead. And I think the lived experience of people with mental disorders saying, "hey, this worked for me, is there any research?" is a really valuable tool for shaping various research questions that are applicable and meaningful to the people experiencing those mental disorders. I absolutely agree with Iain's take on that.

[00:37:55] **Alisha Wainwright:** When you think about your field, nutritional psychiatry, where do you see it going in the next five years and perhaps 10 years?

[00:38:03] **Wolf Marx:** Yeah, so as you can tell, I'm very excited about this area, and I think there's a lot of really exciting things on the horizon. As I spoke about the trials around the ketogenic diet will be coming out, and so we'll see what is the effect of this type of dietary intervention.

There are a number of other studies looking at various other dietary patterns. You know, we've talked about the Mediterranean diet, but I do want to emphasize that this is just one type of nutrient dense dietary pattern. There are, you know, dietary patterns that adhere to the dietary guidelines. I don't think we all need to go specifically onto the Mediterranean diet.

I think there's a whole host of other dietary patterns that just haven't received that clinical trial evidence yet, but that is something that's emerging. I also think the new evidence coming around, generating around the mechanisms related to diet and our mental health will provide that evidence support to provide more personalized interventions.

And then finally, and I think my overall aim and hope for the field is that it's integrated as part of standard care within our medical systems. Again, I think it's really important that it's not seen as something that, "yeah, it's evidence-based, go and try it if you want", it's something that's actually integrated into our clinical treatment alongside antidepressants, pharmacotherapy, physical activity or other lifestyle intervention. It's something that is another arm for our treatment, that we can provide to our patients.

[00:40:03] **Alisha Wainwright:** Wolf, it has been an absolute pleasure talking with you today. Thank you so much for joining me.

[00:40:09] **Wolf Marx:** Alicia, it was a pleasure to chat with you as well. I really enjoyed this. I haven't done too many podcasts, so this was a really enjoyable experience.

[00:40:19] **Alisha Wainwright:** Most of us have been bombarded for years with information about what we should and shouldn't eat, and not all of that information is true or useful. Nutritional psychiatry is different: a scientific evidence-backed approach, looking at how the food we eat could have an impact on the symptoms of mental health conditions. Wolf was keen to emphasize that restrictive diets aren't for everyone, and that there are more questions to answer and further research is needed. But there's room for optimism here with the usual disclaimers that under medical guidance and in combination with other treatments, diet could be another effective tool for mental health.

Thanks for listening to this episode of When Science Finds a Way. Thanks to Dr. Wolfgang Marx and to our contributors Professor Sheri Johnson and Dr. Iain Campbell. If you enjoyed this episode, make sure to follow us wherever you get your podcasts, and like and subscribe on YouTube. When Science Finds A Way is brought to you by Wellcome, a charitable foundation that supports the global scientific community working to build a healthier future for everyone.

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