AUGUST 2025 £6

Mitochondria: more than ATP - what the research says about the nutrients they need

Auto-immune disease: intent on a cure – In Practice with **VJ HAMILTON**

SIBO: what the research says about hypothyroidism, endometriosis, restless legs and probiotics

In news: Diet, not inactivity, fuels obesity, and how micronutrients link to chronic pain

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All disease starts in the gut: and finally we can see what's going on in there!

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AUGUST 2025

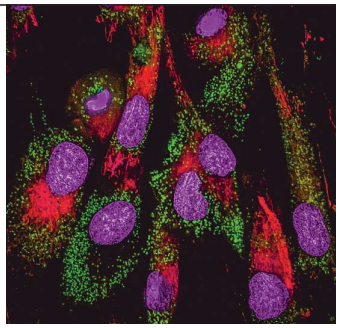
38 **All disease starts in the gut – and finally we can see what's going on in there!**

How personalised can you get with your probiotic and gut health supplement recommendations? The answer is "not very", despite all the functional tests we have available. Now that's all changed, thanks to a true revolution in microbiome testing that is not only providing detailed and accurate info about the make-up of a client's microbiome, but looks as though it may be able to give early warning of conditions such as cancer, Alzheimer's and Parkinson's. Naturopath and nutritional therapist **ELENA PANZERI, MSc**, explains the clinical power of GutID® to editor **SIMON MARTIN**.



26 **Mitochondria — they're not just about ATP**

Mitochondria play crucial roles in maintaining cellular homeostasis, regulating cell death and participating in signal transduction pathways: two new research papers highlight the role of micronutrients in mito health - with one study, on the "discovery" of the mitochondria-peroxisome "bridge" that protects against oxidative stress, ignoring them completely.



48 **Intent on a cure for auto-immune disease…**

"I might not be able to cure it, but I can help people reverse symptoms, feel better in themselves, and get back to living life on their terms", says **VJ HAMILTON**, who takes on clients with tricky conditions like lupus and MS – all due to a promise she made herself as a child. Read her inspiring In Practice story.



IHCAN's contributors Our thanks this month to:

- **Alison Cullen, BA (Hons), DN, DNT (Distinction), nutritional therapist with a clinic in Ayrshire, Scotland, and Education Manager at A.Vogel Ltd.**
- **In Practice featured practitioner VJ Hamilton, BSc (Hons), DipION (merit), mBANT, CNHC Reg, mIFM, ACA: www.autoimmunenutritionclinic.com.**
- **GutID consultant Elena Panzeri, MSc, BSc, founder and CEO of Ayusha Personalised Nutrition: https://www.gutid.com and a new website coming at https://www.ayusha.co.uk.**

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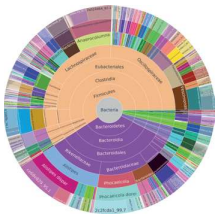
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Intus Bio developed GutID™ by using its proprietary and patented, Next Gen Sequencing and AI technology platform, which generates unprecedented high resolution, strain level bacterial microbiome data.

INTUS BIOSCIENCES

WHY GutID?

- ✓ COMPLETE
- ✓ ACCURATE
- ✓ DETAILED
- ✓ ACTIONABLE INSIGHTS
- ✓ PERSONALIZED RECOMMENDATIONS



GutID WORKS WHERE OTHER TESTS FAIL

- ✓ Discover imbalances or dysbiosis with its complete picture
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- ✓ See with detail what is influencing the Gut-Brain Axis

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- Unexplained Symptoms
- Behavioral/Mental Health
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All disease starts in the gut - and finally we can see what's going on in there!

How personalised can you get your probiotic and gut health supplement recommendations? The answer is "not very", despite all the functional tests we have available. Now that's all changed, thanks to a true revolution in microbiome testing that is not only providing detailed and accurate info about the make-up of a client's microbiome, but looks as though it may be able to give early warning of conditions such as cancer, Alzheimer's and Parkinson's. Naturopath and nutritional therapist **ELENA PANZERI, MSc**, explains the clinical power of GutID® to editor **SIMON MARTIN**.



To start this I'm borrowing a message from Rebel Health's Michael Roesslein for a webinar series by Kiran Krishnan. "Hey Simon, I read this message from an IBS sufferer yesterday and it broke my heart:
'15 years of gut issues... literally hopeless and miserable at the moment. Nothing worked. Complete loss of appetite, 12kg weight loss, anything I eat gives me instant burping, flatulence...

'All day I'm farting or burping. Brain fog, very weak, not absorbing food. Endoscopy, colonoscopy normal...

'Treated *H. pylori*, SIBO multiple times, nothing worked. Can't tolerate fruits at all... everything causes gas, burping, farting instantly.

No energy at all...'". Michael adds: "The person who wrote that message has tried everything conventional medicine and functional medicine have to offer".

Houston, do we have a problem?

IBS is difficult enough to treat without the added complication of not being able to get a clear picture of what's going on in the client's microbiome, but things are changing...

SIMON MARTIN: I first heard about GutID from Heather Rosa at IoN (the Institute for Optimum Nutrition), and as I read into it I realised that this was not a story about yet another microbiome test, but something much more complex. Intus Biosciences' technology generates a unique "fingerprint" for each strain - even for unknown strains – and to share the jargon I don't claim to understand, uses "long-read sequencing" rather than the conventional "16S" or "shotgun metagenomics". This seems to be a true revolution in testing – and thanks to you being able to get them to turn this into an easy-to-read graphic, it's going to open up a world of new possibilities for practitioners. So this conversation might get complex. Because it's not just about the test, but about why we need this test, what is wrong and right about so-called personalised medicine - which, most of the time isn't - and about our choice of supplements, probiotics and prebiotics: how many do we actually need, and do they actually work? So thank you for being here and I hope we can get through some of that!

ELENA PANZERI: Oh, absolutely! I would love to talk about probiotics, especially because so many clients are so disappointed because they are spending a lot of money on probiotics, and then they take the test and it shows zero probiotics - we don't see any of the probiotic bacteria at all – and they are very upset.

SM: So you mean the strains that they're taking, they take them for months, and then you do the test and they don't show up at all?
EP: They don't show up – not all the time, but this is quite common. Then they start complaining. There are two kinds of reaction. The first reaction is "Your test is wrong…it's not accurate". That's impossible. The second reaction is, "OK, I accept that your test is good, but why this is happening?" And there are many, many possible reasons. So it's not enough that you take a probiotic. It goes to your gut. It stays there. It doesn't necessarily colonise…they go to the gut, they can transit, but then they don't stay. That's the problem".

SM: This is something that you see quite often?
EP: Yes, it is quite common.

SM: OK, let's take a step back and get some context here, and how you got involved in this in the first place. Obviously you were seeing clients and using whatever testing was available…
EP: I've been in practice 25 years. I have a Master's in genetics and nutrition. I'm a naturopath and nutritional therapist. I'd been doing a lot of research on the microbiome and then I started with epigenetics, metabolomics, to a point where I start combining everything. For me, personalised nutrition and medicine is really a combination of many different kinds of tests, so that if I have to recommend any supplement – if you really need a supplement - it must be justified. So it's a combination of the microbiome, the metabolomics and anything else. So it's super personalised: it's what we call "super personalisation", to make it even better than personalisation, which is now such a buzz word!

SM: That's great! Because everyone is talking about personalised medicine, and it's funny to see that orthodox medicine has jumped on it and they really have no clue what it is! They think it's to do with figuring out whether a person is suited to a specific drug or not. It's ridiculous. But how did you come across GutID and start to incorporate it? Were you seeing gaps in your testing ability?
EP: Absolutely. As a nutritional therapist, I was using all the other gut tests, which were not really microbiome-focused, because they were looking just at very specific bacteria, and then some other biomarkers, like secretory IgA, or the total amount of short chain fatty acids.

I'm still using Genova, for example, for parasites, for short-chain fatty acids, for calprotectin and so on.

With some other microbiome tests, I found that although I was getting some information, they weren't giving me the actual picture of what is inside the gut. But that is what we had.

When it comes to say, akkermansia, for example, I was finding that if I ran two or three different tests on the market. one is saying akkermansia doesn't exist while one is saying it was very, very high. And now I need to take a clinical decision based on something that probably is not accurate. So this is scary. OK, we're not talking about saving life, or a cure for cancer, but still, what if I give akkermansia to someone who already has a lot of it? My intervention is totally wrong. I don't want that. I want to be sure that the data are essentially 100% accurate, or very close to 100%, because the intervention can completely change the trajectory for the patient.

SM: In this field, what's made the difference is a massive leap forward in technology, is that right?
EP: The technology has really evolved; it's about the actual sequencing, the genetic sequencing. The first technology was 16S. That looks at a very specific part, or the ribosome genetics, or the ribosome genome of bacteria. You amplify that part and you're able to say, OK, there are some genus of bacteria.

When I say genus, that's a big family. It just gives you a generic name, like streptococcus. But you can have very bad streptococcus, like the one that causes pneumonia, or one of the valuable species like *Streptococcus thermophilus* that you find in your yoghurt. So with that kind of very old technology, it was impossible to say precisely which kind of bacteria are there. It was a very generic overview, which from a clinical point of view is not really useful. So you have a lot of streptococcus? But do you have good or bad, what's the mix?

And then we move to something more sophisticated, which is called metagenomics. In metagenomics, we actually sequence everything - bacteria, viruses, fungal species, everything. This can get very expensive, so we have to compromise, and we use something called shotgun metagenomics. We basically shatter the DNA into billions of pieces, and then we try to reassemble it. So the possibility of making mistakes is very high. And then you need to have a "library", because in order to spot a specific species, that species has to be in your library - if it's not in the library, you don't see anything.

So I was looking for something even more precise, more specific. I was very much interested in the strain level. Because even years ago, the scientific literature, the research was saying that it's not really about the species, it's the strain that's important. Maybe it's exactly the same *E coli*, for example, but one strain is very, very bad. You can die. And some other strain may even be protective.

The strain is very important, but there was no technology until Intus Bio developed it.

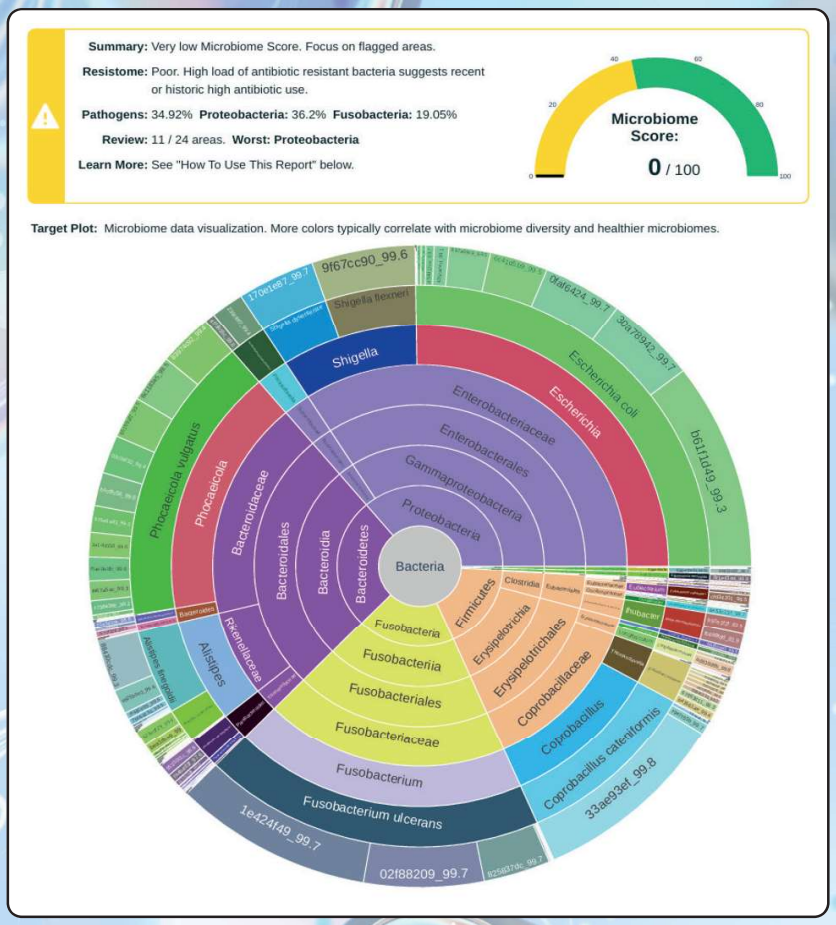
SM: How did you find them? Because this wasn't commercially available to practitioners, was it?
EP: That approached me! Because I was actually posting a lot on social media, talking about how I wanted to see to see the strains, because the strains are the actual most important part of the microbiome….

SM: Oh, so you were making a lot of noise!
EP: And they approached me more than two years ago, saying, "Hey, you know that's what we are doing!" They said it was possible to identify strains, but they didn't know how to use it from a clinical point of view. They are dedicated scientists; they do amazing research, but then the problem is the actual translation, going from research in a lab to the actual patient. And this is what I do. I bridge the gap between the actual research and the clinical application.

So I see clients. I see clinicians. I do training for clinicians. You have to be able to explain that report to the client, because clearly, as you saw, it is very complicated.

SM: The visual is amazing…what I understood from talking to you before was that when you first got involved they were giving you results that weren't actually very useful. Was it just too technical? Yu came up with the graphic, the visual – which is beautiful, by the way…
EP: It was without any specific organisation. Okay, there were some specific markers, like the alpha diversity, the beta diversity, and then species like probiotics. So what I've done is reorganize the bacterial species into specific categories - these are the proper pathogens, these are the good bacteria, these are mucosa-protective, these are the short chain fatty acid producers. So it makes much more sense from a clinical point of view.

And then I went on to organise according to the gut axes: the gut-brain axis, the gut-liver axis, the gut-heart axis and so on so that for the clinician it is much easier to interpret the results.



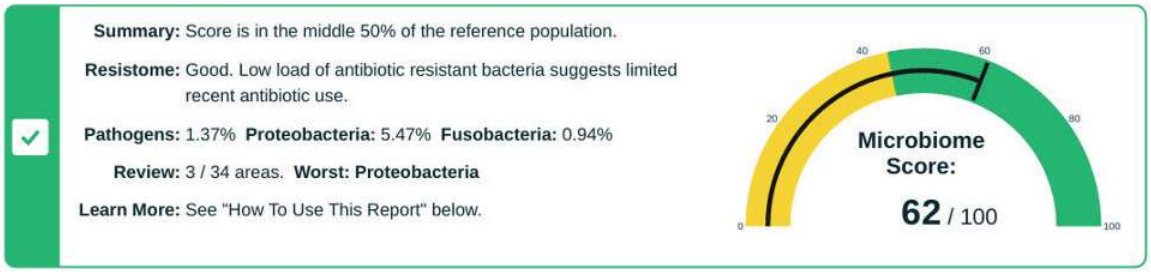
BEFORE and AFTER: a GutID case study from Elena

Baseline: the patient has a score of 0, very high Fusobacteria species (strongly correlated with cancer risk, particularly CRC, but also many others), very high level of pro-inflammatory Proteobacteria and high abundance of pathogens. Earlier colonoscopies were clear, but a subsequent one revealed the presence of a polyp. In this case, my objective is to possibly prevent CRC altogether.

In just three weeks following my intervention, the patient showed some impressive improvements, but this is the microbiome profile after two months. Almost all Fusobacteria are gone, and both Proteobacteria and pathogens have been significantly reduced. Moreover, the protective *Akkermansia muciniphila* is now present in a very good abundance. It is quite evident that the changes have been dramatic.

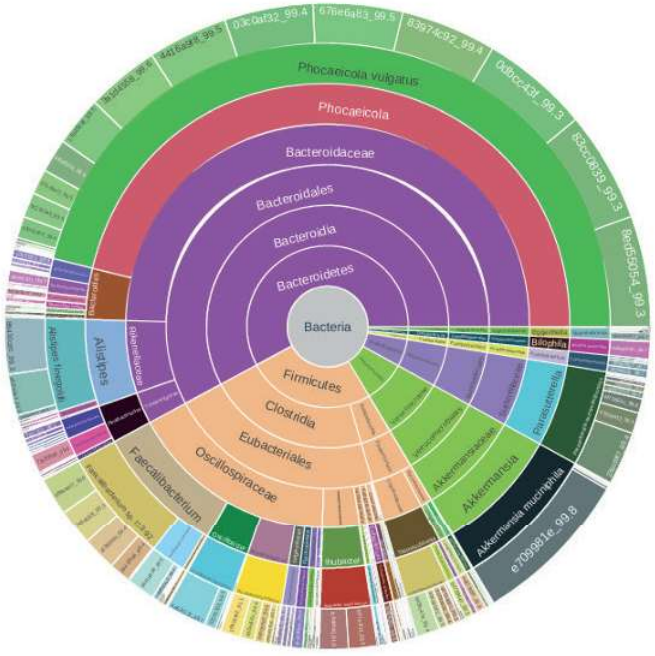
During a very short period of time, the patient experienced improvement in constipation and bloating, which had been present for almost her entire life.

www.gutid.com



Microbiome Composition

The target plot illustrates the individual microbiome composition at all levels, from phylum to strain. Each bacterial species has a specific number of genomic sequences. Therefore, the outermost part of the chart indicates the number assigned to each strain. It is also possible that the gut microbiome sample contains bacteria that have not yet been sequenced or are unknown. Microbiome profiles can be evaluated in terms of their richness, evenness, and peculiar composition immediately by looking at the graphic representation of the bacterial evolutionary tree.



Resilience & Biodiversity

SM: How did you start using it in in your everyday practice? What difference did it make?
EP: A huge difference, because I started observing completely new species, species I'd never seen before! So if you are not able to sequence all the bacterial species in the gut, you have a partial idea of what's going on, right? But when you start seeing all of them, you start thinking, "Right, now I know why my patient has IBS, for example, chronic GI problems". Other tests didn't pick up anything strange. But with this test, I see something is completely wrong, maybe even a very rare kind of species not seen in many other people. So it does make a lot of difference, a lot of difference.

SM: What do you do with that? You see this peculiar strain, and then what do you do? H
EP: I don't use antibiotics. I'm not a doctor., I'm a nutritional therapist, I'm a naturopath, so I use completely natural antimicrobials. And so I actually simply observe the very specific antimicrobial in action. They are incredibly effective, so they make some very bad bacteria disappear. Or I combine a specific type of fibre with this antimicrobial. So the combination of fibre and antimicrobial can actually reorganise the microbiome composition. The good bacteria start increasing, and the bad bacteria start decreasing.

SM: What kind of antimicrobials are you using?
EP: I don't want to give a specific brand name. I use a combination of some medicinal plants – like berberine - and essential oils, like oregano. These kinds of plants are very strong, and they are not just healing the bacteria, they disrupt the biofilm that many of these bacteria create – making it very difficult to get rid of them – this is especially true of fusobacteria.

Just to give you an example, the fusobacterium species is very strongly associated with the risk of cancer, especially *Fusobacterium nucleatum* with colorectal cancer. I've seen this over and over again. This is real. But if you go to any doctor, even if they see fusobacterium, they don't know what to do. There is no proper "cure" for fusobacterium.

From my clinical experience, I can tell you it's totally possible to completely get rid of fusobacterium species with these very strong natural antimicrobials that destroy the biofilm, and at the very end kill the bacteria. So it's totally possible.

SM: And you then you put in the specific fibre?
EP: Yes, because specific fibres can help the good bacteria to increase. And so they create the right environment. Because everything in the microbiome is really about balance. It's not about one single species that is "off". This is an ecosystem. It's a sort of very big community. So in a community, you need to have the good and bad. It's just a matter of the right balance.

SM: Oh, so you're not trying to completely obliterate the so-called "bad bacteria"?
EP: It's more complicated than that. You need to create the right kind of environment, right? A good environment with good food. Because if you want, your probiotics to survive, you need to give the right kind of food. This could be one of the reasons why you are taking probiotics, but they don't seem to work – they are not able to colonise the gut because they don't have food.

SM: I shouldn't be surprised that you said that, but I am, because surely you just take the probiotics! And I understand you might add inulin or something like that, as well, but you're talking about the overall food intake as well. You're talking about the diet.
EP: I think it's a combination. The best way to have a very strong, very resilient microbiome is to have a lot of variety in your diet. If your diet is very monotonous, always the same, even if your food is super-healthy, that is not helping your microbiome.

> "So the combination of fibre and antimicrobial can actually reorganise the microbiome composition. The good bacteria start increasing, and the bad bacteria start decreasing".

SM: Oh, that's bad news. I do have a very monotonous diet because I've figured out what "works", and so I eat the same thing over and over again.
EP: Well, you may be fine. Get tested. Never make any assumptions regarding the microbiome.

SM: This is also important for people who are on very restricted diets - like the carnivore diet, for example.
EP: Low FODMAP is another one. It does work. Of course it does, because the FODMAP foods are very rich in specific fibres, fermentable sugar...so you stop that kind of food and you are not bloated anymore. Obviously. But this is not the cure. This is something that you can do, let's say, for a couple of months, but at the same time, you need to cure the gut. You need to target the problem, the cause of the problem. You cannot stay on a low FODMAP diet forever, because, for example, your bifidobacterium species, they die. They just disappear.

SM: What!?
EP: If you continue for a very long time on a low FODMAP diet, yes, it does decrease the bifidobacteria very, very strongly. Because bifidobacterium love inulin. They love all the fermentable carbohydrates! This is why nothing is forever OK, unless it's REALLY necessary. A very restricted diet must be prescribed by nutritionist and also you have to ask whether you really need to have a restricted diet? Maybe, yes, maybe no.

SM: I can't translate into words that Italian gesture that you just made, but it said it all!
EP: And it's the same for probiotics. Again, there is a lot of debate, do we need to have a lot of probiotics in the gut? Because the general perception is probiotics are good, right? Surely bifidobacterium species are always good. Well again, not 100% of the time. Sometimes we see people incredibly sick with neurodegenerative disorders or with cancer, where lactobacillus, bifidobacterium, or both, they start increasing to very high level. This is not a good sign! This is something that people really need to understand: it's not just about getting rid of very bad bacteria or about very good bacteria – it's really about the balance.

SM: You said "nothing is forever". So you don't want to be taking the same probiotic for years and years, because that is going to disturb you, even though probiotics are "good".
EP: Absolutely. And then you change, too...

SM: Oh yes, that's a great point.
EP: So something you were taking ten years ago - it's not necessarily good for you now. It's unavoidable that you're going to change, so you need to adapt. Same is true for your microbiome.

People always ask me, what is the perfect microbiome profile for good health or to live longer? Well, it depends. It really depends. The microbiome of centenarians or ultra-centenarians is very similar to a microbiome of a very young person. It's as simple as that. And they do have a lot of diversity again. So one of the key words in the microbiome is diversity – to have as many bacterial species as possible. This is very protective. Then, normally they have the right amount of akkermansia, for example, they do have a very good amount of short chain fatty acid producers. But again, everything in a very nice balance.

SM: How does that work? Because babies, infants, they're getting their microbiome from their mothers…
EP: And their environment…

SM: OK, but why would a young child, for instance, have a very diverse microbiome? I don't see where that comes from.
EP: They don't. In the first three years, you have a very simple microbiome. So a toddler up to the age of 36 months, the vast majority of the microbiome is bifidobacterium. They have a lot of bifidobacteria, especially if they were breastfed. If they were bottle fed, they may have a completely different microbiome composition, but for very young kids, it's normal to have a lot of bifidobacteria. After that, you start adding more and more diversity. It's a process. It doesn't happen when you were born.

SM: To go back a bit, I was interested that if you're faced with a client who's got a "strange" microbiome - let's put it that way – it seems that the first thing you do is use antimicrobials and fibre rather than just throw in a supplement of the species they don't have enough of.
EP: Yes, the first thing to do is to rebalance the microbiome. I don't want to see many bacteria to be out of range. They need to be in the right ratio, for example. But then, just remember, the microbiome is only one piece of the puzzle. So I'm a clinician, I need to ask a lot of questions. So it's not that I see the microbiome report as a sort of magic tool, or that I'm going to get everything from the microbiome, because some people actually expect that you're going to be able to tell them whether they are going to die of cancer, or whatever. You need to use the microbiome in context. You need to make the right connection between the medical history, the family risk factor, the diet, the medication, the supplements they are taking, the physical activity, the stress level…when you have all the information, then you can interpret the microbiome test.

This is why it's so difficult, because you need to have all the other information, you need to have the practice, the knowledge, and the experience to put everything together. Otherwise it's only random.

SM: Understood. So you start with antimicrobials and fibre to balance the whole thing out, and you're not immediately going to throw in lactobacillus, say, because it is low or missing on the report.
EP: That would be totally wrong. In functional medicine, we do use some steps, what we call the four Rs. So we start with "Remove". So if something is wrong, we remove it. So if you have a lot of pathogens or proteobacteria that cause inflammation, or whatever it is, you get rid of what is the problem.



And then little by little, you "Repair". So, for example, you decrease the inflammation, you improve the intestinal mucosa. Usually, giving probiotics is the last step. If you start with the probiotics, maybe they are not causing problems, but most of the time they actually do. They can worsen the symptoms. Or they do nothing at all, which is not great anyway.

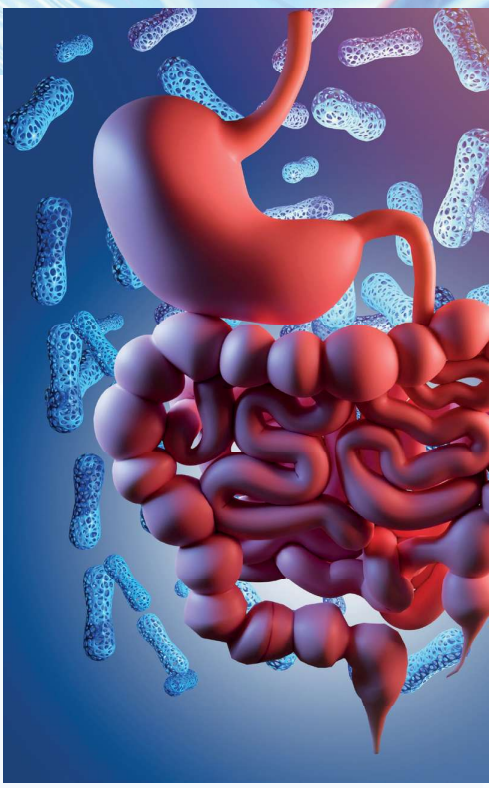
SM: Remind me of the other two steps – it's Remove, Replace, Reinoculate, and Repair, right?
EP: Reinoculate means, for example, giving probiotics. The last two steps can actually be done together. But "Remove" is really the very first . Yes, you can try to give glutamine, for example, to improve the intestinal permeability, or directly give the probiotics, but if you forget about the remove it's not going to work.

SM: That's very cool - there is a logic to it. The 4 Rs have been around for decades, but it still works.
EP: It actually does. It makes total sense. Remember, I was talking about food - so if you don't give the right food to the probiotics, then they won't survive. But it's also a matter of space. There is only a certain amount of space available. So if there are a lot of pathogen or lots of other bacteria, physically there is not enough space for the probiotics to stay and colonise. So you need to make the space available.

SM: That is really interesting. We've all heard about colonisation in the space, but it is actually a physical restriction. That's amazing. So when you get the result, and you start to remove the unhelpful bacteria, how long does that take to play out, and when would you retest? Ideally, I presume that although testing can be expensive, you would be trying to retest as often as possible?
EP: So if there is a problem, I want to solve the problem. Let's say I saw the fusoform bacteria I was talking about, or I saw very high abundance of proteobacteria or pathogens, I do my intervention and I want to check whether it's working or not. So I normally suggest to retest after two or three months.

SM: Two or three months, is that all?
EP: Yes, it takes time to change the microbiome, but not that much. So two to three months is the average if you're doing the right things.

SM: And what's going on in the client in that two to three months? Are they seeing an improvement, or are they just kind of still pretty much the same?
EP: It depends. For example, let's say they do have a lot of pathogens like *E coli* or klebsiella or salmonella, even something very bad, and you give antimicrobials…there are two possibilities. There are clients who actually respond very strongly. They can have die-off kind of symptoms. When bacteria start dying, they release toxin. The system can be overwhelmed, and maybe for a few days the clients experience some flu-like symptoms, or headache or fatigue, or they are simply "off", in a way. Usually this doesn't last for very long - just a few days. You just need to take it easy.



Drink lots of water, have a very simple diet. Don't drink alcohol. So don't overwhelm the system and deliver even more toxins - and then it just goes away.

Others don't feel anything at all. Actually, they start improving pretty much immediately.

I saw a doctor in the US. She had a horrible microbiome score, a horrible microbiome composition. We saw a lot of fusoform bacterium species along with many other not very nice bacteria. She took the antimicrobial. She didn't have any side-effects, but her constipation improved immediately. She'd been having constipation for ages. So the actual reaction is very personal.

Generally speaking, they feel better, not just about the gut, but they may have more energy, they can sleep better. I did see many patients taking fibre and because of the fibre and the changes in the microbiome, they sleep better, so they say, "Oh, I didn't notice anything going on in the gut, but I'm sleeping amazingly", so you know there's something going on.

SM: You've graciously provided "before and after" visuals of the microbiome of the doctor you were helping, and with her you saw results VERY quickly, is that right?
EP: With her it wasn't just a before and after three months, it was after three WEEKS! We changed the microbiome in three weeks., completely. That was a pretty good success – and she felt it for real.

SM: That is amazing, and there were some surprising findings with her as well?
EP: Remember, it's also for prevention. So we saw these particular species, like fusoform bacteria as well as two or three others that from our perspective suggested risk of colorectal cancer. We asked her to go and have a colonoscopy. She didn't want to, because she said she had Cologuard [an at-home stool test] and had had a colonoscopy only two years ago – and it was totally clear. She knew what the preparation for a colonoscopy involved, and she just didn't want to do it.

In the end we convinced her – and they found a pretty big polyp. What that means is that we are able to see the changes in the microbiome ages - I mean, we are talking years - before you get cancer.

SM: That's outstanding. It means you have time to change things.
EP: Yes, knowing before you get cancer is ideal, because when you get cancer it's already a little bit late. I want to prevent cancer if possible, and this is why I'm really interested in the microbiome, because I know if I change what is going on in the microbiome, the metabolites the bacteria produce, the kind of toxins, I know I can actually change the trajectory of the patient. And it's real. This is real prevention.

SM: What's striking about this is she started seeing these results just with the antimicrobials and the fibre. So you hadn't even really started what you would call "treatment" yet.
EP: No, this WAS a treatment! But we didn't work on diet or anything else, because she was already under a lot of stress. She told me: "Don't talk about the diet. I'm not really able to do a lot. So keep it simple, please". So I did, but you know, when you have this kind of result, then the client is very motivated.

You don't have to do a lot of talking! It's palpable, it's tangible; you don't have to convince anybody to get a test. They know they can believe you.

SM: That's great to know, and also because she's a doctor, you would think there would be a big pushback: "I know what I'm doing", "I've got my colleagues who are experts…".
EP: It was like that at the very beginning. She didn't even want to take the microbiome test, but it was a gift for Christmas, so she said "Whatever, I've got to take this test". And then we saw this red flag. After the colonoscopy, she actually believed it. She'd had a colonoscopy two years ago and they didn't find anything. So if your colonoscopy is clear, you don't have to repeat it for another ten years, or even 15 years; so she would have waited for another eight years to have another colonoscopy. It probably would have been very late by then.

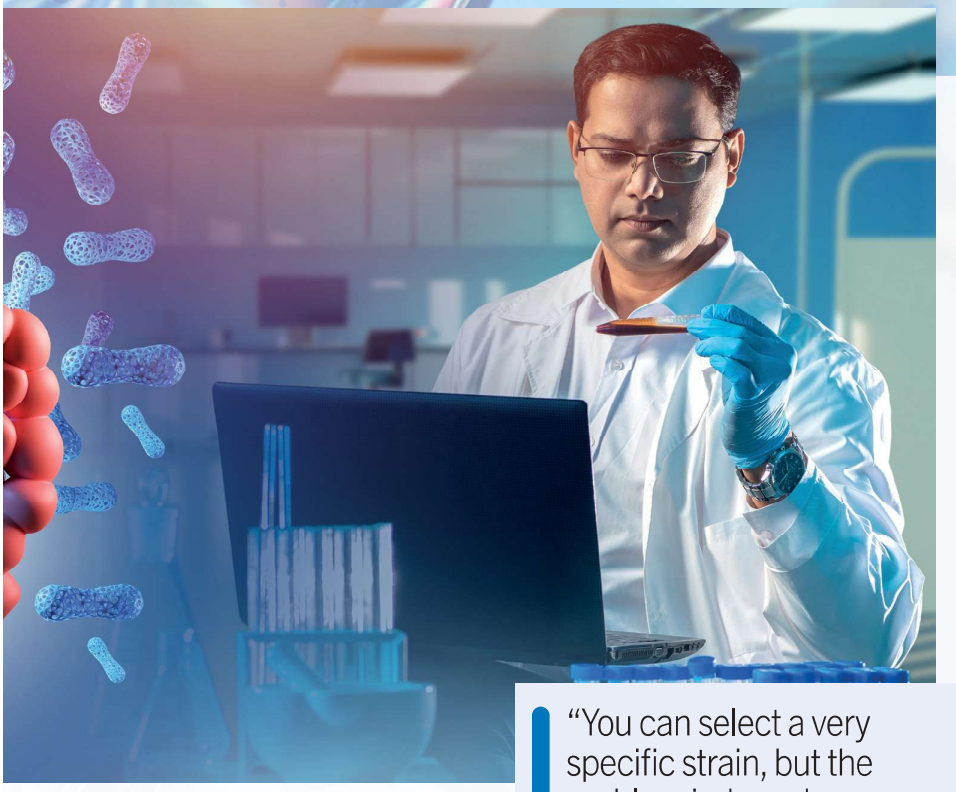
SM: It's incredible what you're doing with this. Let's talk for a moment about the actual probiotics. Because eventually you're going to put a product in, but I gather that what you're able to do from using this test is you're able to personalise this in a meaningful way. So you know pretty much what to supplement with, is that true?
EP: Not 100%, but yes in most cases, in the sense that let's say I see a very specific strain of bifidobacterium, and then I'm able to say, OK you are taking a lot of probiotics with many different strains, but the reality is in your gut there is only one present. So let's work with something different. They can then add more diversity so that can actually improve the symptoms as well. So this is a form of personalisation. But I think in the very near future, we're going to be able to do even more than that.

The problem is the actual literature. The scientific evidence regarding, for example, specific strain of probiotics, is still to be proven 100%. So there is still a lot of research in this area to be done. We need more scientific evidence to be able to know whether it is really true that if I take this specific strain, it's going to have this specific effect - or is again a matter of a combination of different strains and then rebalancing the microbiome composition.

This is why I go back to the to the fundamental question: what is more important - to personalise this strain or to rebalance the microbiome? Start with something very simple: rebalance. If you rebalance the microbiome it is much easier to get results - much, much easier.

SM: I still struggle with this idea that you can put one strain in, for instance, *L. reuteri* - but there seems to be a lot of a lot of research behind that. So what's going on? How can you put one strain in to this incredibly complex system, and it has an effect? Doesn't it get overwhelmed? I mean, in your experience, does that work?
EP: This is why we very rarely give one species or one specific strain. They work very well together. So, for example, to increase akkermansia, I suppose you know *Akkermansia muciniphila* pretty well, because it's the new star of probiotics…

SM: Yes, this is the one that feeds on the mucus layer of the intestine and keeps the gut and gut immune system healthy…
EP: Sometimes you improve the lactobacilli and the bifidobacterium without giving akkermansia, but you'll see akkermansia improve because they "talk" to each other. They produce metabolites and this is a form of



communication; they actually communicate. So if they say, OK, this is the right place to be, because this is nice, there is enough food, the environment is friendly, then they start colonising. Otherwise they simply go on through. So it's not that simple.

Again, in a very near future, we may have something like genetically modified strains able to reach a specific place and do something very specific. I think we are pretty close nowadays. We are doing a lot of research, for example, on neurodegenerative disorders. You can select a very specific strain, but the problem is, how do you deliver the strain? How are you sure the bacteria are going to go there and stay there and do something.? That's the problem. We are not there yet.

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SM: How much of a problem is there, really? Because, I mean, probiotics have been around for a long time now, and the kind of professional grade probiotics that we use are all able to survive the digestive system, and twill specify on their labels how many colony-forming units they have. So why is there a problem with delivery?
EP: I think the problem here is more to do with the condition of the host. If the environment is not the correct environment, you can give billions and billions and billions of colony-forming units, but they simply don't survive. So it's not a problem with the quality of the probiotics, it's really a problem with the host gut microbiome.

SM: That's a great insight. We know the terrain is important.
EP: The client may be taking medication that is interfering with the microbiome - a notorious example are PPIs [proton pump inhibitors], for stomach acid. Or thyroid medication. Even antidepressants! They can have a very nice antimicrobial effect and anti-inflammatory effect, which is good in the short term, but in the long term, they can actually destroy the microbiome.

So you see, this is why it's important to ask the correct questions of your client; it's not just a matter of they take the supplement, they go home, they feel better, that's it! This is why real personalisation, as you were saying at the beginning, is so complex.

SM: That's another really good point. But also, as you mentioned earlier, you have to clear the space so that they can colonise, so even at that basic level, that's part of the delivery, isn't it? Probiotics suppliers have been trying to deliver more and more, so over the years we've gone from millions to billions in a capsule. But if there isn't the space for them, it's a waste of time..
EP: Yes, a waste of time, and money. Some probiotics are incredibly expensive.

SM: The other aspect that I picked up from what GutID have to say about themselves is that the test is going to enable you to figure out, again to personalize or super-personalise - what supplements might be useful. So thinking about things like glutamine and butyrate and all the rest of it; in the standard nutritional therapy, functional medicine model, glutamine is a no-brainer, because it heals leaky gut, and we've got to boost butyrates, so we must put that in...
EP: That's the problem. If you don't know what's going on in the microbiome, what are you going to do? You're simply going to randomly give any kind of supplements, hoping that one or all of them are going to work.

SM: Well, yes, to some extent that's what we do – and we monitor the client to see what IS working. Which admittedly, can get quite difficult to do.
EP: That's why we are testing. And we do have many other tests in functional medicine. We say, "Test, don't guess". Well this should be exactly the same for the microbiome. I don't want to guess that you need butyrate. I want to see whether there is inflammation, whether there are enough species producing short-chain fatty acids. If you have enough, why should I give you butyrate? There is no reason for that.

Same for the probiotics. Same for the akkermansia, same for the fibre. So, again, you need to have a very rational way to approach and to treat; it's not just giving a long list of supplements.

It's very common, especially with American patients, to find they are taking an enormous quantity of supplements. I'm talking about 40-50 pills or capsules a day. Then they take the test, and the microbiome looks so strange!

When they ask me why - after all, they are taking all the "best" supplements - my usual answer is, well, maybe you are taking far too many. Number one, I have no idea what is causing what because scientifically speaking, if you are taking 40 different kind of compounds, I have no idea where the problem is . Number two, if you are taking random stuff, you are not targeting anything specific. So you have no idea about what might be causing side-effects. So the fact that they are natural doesn't mean they are safe, and then you don't even know the interaction between all these supplements or what they actually do to the microbiome, because while we do have evidence of what butyrate is doing, what glutamine is doing, what everything together is doing – we don't know. There is no research regarding the actual combination of 50 supplements, so take one or two, be targeted. Be precise.

SM: It's funny you say that, because I take a lot of supplements – although mine are targeted and I think I know what I am doing, ha ha. But yesterday I was getting my supplements into a nice little pile to take, and I realised that many of the jars say "best taken with food".

And I looked at my pile and I thought, "But this IS food. This is a meal!". Even just the gelatin that I'm taking must count as a snack! But these patients that you see taking 40 or 50 - have they been recommended by a practitioner, or are they just responding to the latest social media?

EP: You don't need a prescription to buy magnesium, or whatever, so I think they are going by what they've read somewhere, or they heard on a podcast, or they watched the tv. And every single time they think, "Oh, now I need to take this". Now for the vast majority, it is very rare that they have only seen one clinician. So they end up with a very long list of supplements. Some clinicians do like to give a lot of supplements. But for me, it's not a very good sign. A good clinician doesn't need to prescribe everything; you know exactly what is very effective. And then maybe you can cycle. You can do two months with a few supplements, then change, and test, see the difference, and move on. Normally these people are just listening to somebody else, and they believe that taking more supplements is going to help them.

SM: And they're doing that with their food as well. They'll go carnivore, then intermittent fasting, then 5:2, then low-carb, gluten-free (that's me), dairy-free….

EP: I'm a very big fan of the keto diet. I love it, but it's not for everyone. You cannot simply go onto a keto diet and believe that it's going to cure everything. For me, I cannot really follow 100% a ketogenic diet because I'm very skinny, so I need to adapt the diet to myself. This is, again, personalisation. It's not about the blind application of a diet. Even if the diet is super amazing with a lot of scientific evidence, it has to be the right diet for you.

SM: My experience with keto as well is that it's not, as you've said, forever. It's a very good intervention, but people have adopted it for life and I'm not sure whether that's a good idea.

EP: Unless, obviously, you have epilepsy, untreatable epilepsy, and there is no other option. Or you have a brain cancer and you're trying to survive, so go on that diet immediately. But if you don't really need it, you can stay, as you said, maybe a few months or even a year, on a ketogenic diet, and then move to a very low-carb diet, which is not exactly the same, but still very effective.

SM: Yes. I don't go into ketosis without extreme carb restriction. I can lean out on it, but it wreaks havoc with my athletic performance. And then I wonder what it's doing to my microbiome? I suspect it can't be good, but I don't know

EP: Again, it really depends on the individual. A keto diet actually can help stabilise the microbiome in some people. But it's true that in a ketogenic diet, for example, like some carnivore diets, there is very little fibre, so you need to compensate. You really need to compensate. This is why it's very useful, again, to take a microbiome test to be sure whether something is not getting completely out of balance.

Here again we have to take account of the level of physical activity, the amount of calories, the stress level, because let's not forget that sometimes we do see a very strange microbiome profile, and the patient is eating OK, is taking the right medication, the right supplements, but the stress level is incredibly high. Cortisol and the HPA axis and the obvious stuff like that does have an impact on the microbiome, because the microbiome is not an isolated system. It does actually communicate with all the other systems. So of the host is under stress, the microbiome is under stress. Pretty obvious. So sometimes it's a matter of telling them to stop the probiotics and do something for their mental health, or go and have some psychotherapy, or do meditation or do yoga, something like that.

SM: "Of course". Yes, it's "obvious" that it communicates everywhere, but despite our acknowledgement of systems biology, we still tend to think of these things as being in separate paper bags. So we have an immune system that goes in the bag, and we have a microbiome that's in another bag and the endocrine system is in that bag, and we forget that it's a whole interacting system – and it sounds like the microbiome is calling the shots.

EP: In the microbiome, this kind of communication is very strong. So the immune system, the endocrine system, the nervous system, they do have a very strong kind of influence on the microbiome and vice versa. So the microbiome is influencing the central nervous system. It's making a very big difference in the immune system and even in the way you metabolise hormones, for example,

For me, because I'm perimenopausal, I love everything related to perimenopause and menopause. I advocate for women to take body identical or bioidentical hormones, but then I explain that if you want to do this, you need to look after your microbiome, because there are some bacteria in the gut, that can actually recycle oestrogen. So if you are taking a dose of those oestrogens you may be thinking you're getting more than enough, or maybe it's low, but be aware that your bacteria may be recycling the oestrogen. So this is why, again, you need to take into consideration every single aspect.

> "I think the problem here is more to do with the condition of the host. If the environment is not the correct environment, you can give billions and billions and billions of colony-forming units, but they simply don't survive. So it's not a problem with the quality of the probiotics, it's really a problem with the host gut microbiome".

SM: I know you are very interested in the gut-brain axis – could you tell us a bit about your work in that area?

EP: Of all the bi-directional communication going on between the gut and various other systems, the most famous axis is the gut-brain, by far. As with everything else, the gut is communicating with the brain, and the brain is communicating to the gut.

So when we talk about Parkinson's, or multiple sclerosis, or even "just" IBS, these are typical kinds of conditions falling under the gut-brain axis.

I say "just", because in reality, IBS is a nightmare! It's very difficult to treat, much more I believe, than some other conditions, because there are so many elements in IBS.

So the central nervous system is creating neurotransmitters that can affect the gut system. But at the same time, the bacteria in the gut are creating neurotransmitters, or they metabolise substances, that can actually affect the nervous system. So this is what we call the gut-brain axis. It is incredibly complex, but I think it's going to be one of the most amazing and exciting areas of research.

By the way, I'm doing a PhD right now on the gut-brain axis, Parkinson's and Alzheimer's: how the bacteria in the gut can actually trigger a neurodegenerative disorder?

SM: Seriously?

EP: We already have some evidence. I just want to demonstrate the actual biological mechanism.

SM: That's fantastic. So, as you were talking about being able to predict onset of the colon cancer, we know that Alzheimer's starts way before any symptoms show up, so are you saying that the state of the microbiome cold

predict these kind of neurodegenerative disorders?
EP: OK, so do you know what the very first symptom of Parkinson's is, even 20-25, years before we know what it is? It's constipation.

SM: You are kidding me.
EP: No, no, t's symptom number one in all Parkinson's patients.

SM: Well, that's terrible, you can't say that, because now everybody with constipation is going to be thinking that they've got Parkinson's on the way!
EP: No! Obviously not! You need to look at the family history, because sometimes there is genetics involved. But also you need to take the microbiome test, because I see some specific signatures, because I know some bacteria can cause some inflammation, or because they create some metabolites, that actually reach the brain and they start triggering the process.

SM: Wait a minute, are you saying that there's a specific signature that you can pick up in the microbiome that signals Parkinson's down the line?
EP: This is what I want to establish in my PhD. We do already have some evidence. We know that the communication is actually happening through the vagus nerve.

And what we've seen in some studies in that people who have had the vagus nerve cut, they never developed Parkinson's.

SM: Why would anybody cut the vagus nerve?
EP: Well, because there are certain rare conditions where there is a miscommunication and there is no way to actually do anything through drugs. It's a very extreme procedure. Obviously, it's not very common, but it does happen, and they discovered over time that all these people, for them it is impossible to get Parkinson's.

SM: The things you're throwing out here are astounding, because I'm thinking about the women who have radical mastectomies as a preventative measure for breast cancer. And now you're saying that people with a genetic predisposition to Parkinson's could opt to have their vagus nerve cut.
EP: No, the solution is not to actually cut the nerve…

SM: But you know that's where orthodox medicine will go with this…but let's get back on track. What are you looking for?
EP: It's a matter of finding out what is causing the problem. So which kind of metabolites or toxins very specific bacteria in the gut are producing to actually cause this miscommunication, and triggering the deposition of very specific proteins? Many neurodegenerative disorders are about misfolded proteins, so this is the problem. But what is triggering this? That is still a mystery, and now we know that it is probably being triggered by the bacteria in the gut,

SM: Wow. So this would be true for dementia, Alzheimer's as well? And you're a naturopath and we've all been taught that disease starts in the gut – and here we go again.
EP: Yes, we are going back, but now we know the mechanism. This is the only difference. I was a naturopath 25 years ago and I was actually curing my patients by giving probiotics. I didn't know why this was happening. That's the point. I knew about the gut, brain and immune system. But basically, I was curing people with dermatitis or autoimmune problems, or even anxiety and depression, by giving probiotics. It was , it was working, most of the time, but I really didn't understand the reason. I didn't have the evidence. So now, 25 years later, finally, I have the answers.

SM: So you must feel the cycle is complete. And you're focusing on the gut- brain axis but, as we said, there's a gut-endocrine, there's a gut-immune, so this is impacting everything.
EP: Yes. For example, let's say that you need to have a liver transplant. We now know that if we change the microbiome, you can have more success in the transplantation. This is getting serious now! Immunotherapy s another very big application for the microbiome. If you have cancer and your best shot is immunotherapy, we know that in half of the cases, immunotherapy doesn't work - we don't know why - or produces very serious side-effects. So you need to stop the immunotherapy. Now we know that a lot of this depends on the composition of the microbiome. So if you change the microbiome, you change the response and get a more successful response to immunotherapy. This is big, this is about the prestige of medicine.

SM: And this is not in any way seen as some kind of whacky "alternative"?
EP: It is pure scientific evidence. It's all published.

SM: In 1982 when I was the launch editor for the world's first *Journal of Alternative Medicine*, Monica Bryant wrote what was probably the first-ever article on probiotics. She was the first to bring probiotics into the UK. She was taken to court by Trading Standards and other idiots five times on the basis that she was feeding people faeces.
EP: And now they're REALLY feeding faeces in faecal transplant programs!

SM: Exactly. My point is that in my lifetime, well 45 years or so at least, it's gone from "This is ridiculous. You're poisoning people by giving them probiotics; we can't have this", to "Hey we can use probiotics to alter the gut, improve health, and cure cancer and Alzheimer's!" I'm exaggerating, but as a long-time naturopath, you like me and many of *IHCAN's* readers are nodding along thinking "Yeah, we knew all this. Hey modern medicine, glad you're catching up with us!".
EP: It's kind of late, but you're getting there!

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• The basic test is priced at £349.00. Practitioners can register at https://www.gutid.com and will be eligible for a free test.

About



ELENA PANZERI MSc, is the Founder and CEO of Ayusha Personalized Nutrition, London (UK).
Elena holds an MSc in Nutrition and Genetics from Twickenham University (UK) and a BSc in Nutritional Therapy from the University of Westminster (UK). Additionally, she holds a three-year diploma in Naturopathy as well as a four-year specialty in Homeopathy from the Instituto Rudy Lanza, one of the most renowned naturopathy schools in Europe. She is currently engaged in a PhD project focusing on the role of the gut-brain axis in neurodegenerative conditions such as Alzheimer's and Parkinson's disease.
The result of many years of highly ethical and professional training, Elena has been practicing natural medicine and nutrition for more than 25 years. Her main area of expertise is personalised nutrition, which encompasses functional medicine testing, nutrigenetics, epigenetics, microbiome analysis and metabolomics.
At present, she is focused on implementing and translating all omics technologies into clinical practice in order to offer cutting-edge testing to patients in addition to more traditional healing methods. A few of her specialties include longevity, chronic and degenerative disorders (eg cancer, neurodegenerative disorders), metabolic dysfunction, women's health (especially perimenopause and menopause support), and highly personalised nutritional therapy.
Elena has been consulting with Intus Biosciences, a US-based company developing GutID®, the innovative microbiome test, for more than two years, assisting them in developing reports that are highly actionable from a clinical perspective.
As a result of her experience, she has been exposed to hundreds of microbiome profiles from patients around the world, resulting in an unparalleled level of expertise, especially in the field of complex cases.

• Find Elena soon at the new website at www.ayusha.co.uk and meanwhile at www.gutid.com