



## Hormone balancing for pain and fatigue

**Guest: Dr. Anu Arasu**

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### **Kirsty Cullen - [00:00:16]**

Hi, I'm Kirsty Cullen, CEO at the Optimum Health Clinic. Welcome to the Fatigue Super Conference. Today I'm joined by Dr. Anu Arasu.

Dr. Arasu is founder of London Bioidentical Hormones, which is an online clinic that specializes in treating a variety of hormonal imbalances with both bioidentical hormones and a holistic and functional medicine approach.

Dr. Arasu is also author of the book *Bioidentical Hormones Explained* and a member of the Royal College of Physicians and the Royal College of General Practitioners, as well as an applied functional medicine graduate.

She also holds diplomas in child health and sexual and reproductive medicine.

It is my pleasure to welcome you today, Dr Arasu.

### **Dr. Anu Arasu**

Thank you, Kirsty. It's a pleasure to be here.

### **Kirsty Cullen**

So today we're going to talk about the endocrine system and hormonal balance. And I think first it's important to make the link, isn't it, between hormones, optimal hormone balance and Chronic Fatigue itself. Perhaps you could explain that for us.

### **Dr. Anu Arasu**

Yes. So there's a very big link between Chronic Fatigue and hormone imbalance, because the vast majority, the overwhelming majority of patients with Chronic Fatigue have a dysfunctional hypothalamic pituitary adrenal axis.

And it makes sense because if we think of Chronic Fatigue as essentially an imbalance between the stressors that we're exposed to, whether those stressors be chronic infection, such as viruses, Epstein-Barr, Herpes Six, whether it be environmental toxins, heavy metals, chemicals, whether it be gut dysbiosis, if we think of it as an imbalance between the stressors and the body's ability to handle those stressors, then it makes sense that the entire hormonal cascade that controls and mediates the stress response is going to be altered.

And I think the second thing to say is that even if the initial dysfunctions or imbalances that may trigger a Chronic Fatigue, the initial stressors may be infections or heavy metals. Hormones are going to be a huge part of propagating, prolonging and making worse the pathology that is going on. So that is a cycle that we want to be breaking.

And I would say that unfortunately, this is such a big and important topic, but unfortunately, it's not yet being handled in traditional medicine as much as we would like, because although traditional medicine knows that stress is linked to just about every disease under the sun, we are still leaving a lot of the pathways about how stress is mediated and how it impacts on other parts of us in the literature.

And I think this is why, in a way, the term adrenal fatigue has been coined and it's come onto the map, because adrenal fatigue it may be a bit reductive as a term. It doesn't necessarily give the whole picture, but it's been quite useful because at least now hormonal imbalance is on the map.

And I think what we want to start moving towards is more of a use of the term hypothalamic pituitary adrenal axis dysfunction, because if you go to the big journal searches, things like PubMed, and you search for adrenal fatigue, you're not going to find many papers, you're going to find about a dozen and some of those are going to say, what is this?

If you search for hypothalamic pituitary adrenal axis dysfunction, you're going to get over 19,000 hits. So this is a big deal. It's real and it's a real part of the pathology of Chronic Fatigue.

### **Kirsty Cullen - [00:03:48]**

Wonderful. And at this point, I would also like to clarify exactly what bioidentical hormones are. Because there can be a lot of confusion around what is classically understood as the term hormone replacement therapy and then the various nuances around hormone therapy, in fact. Perhaps you could explain the differences for us.

### **Dr. Anu Arasu**

Great question. So bioidentical hormones, quite simply, are hormones that are identical in structure to the human body's own. As opposed to synthetic hormones or hormone like drugs that are not identical in structure to the human body's own. And the reason why that's really important is that synthetic hormones, as well as binding to the hormone receptor, will go bind to other steroid receptors, and that can cause unwanted effects.

So you might say, well, surely all hormones are identical in structure to the body's own and that makes sense and it does make sense. But when hormone replacement was initially discovered, one of the first ways that we got oestrogen replacement was from pregnant horses, pregnant mare's urine. So the oestrogen derived from that urine would have contained equine estrogens, which are not identical in structure to the human body's own. So, of course, they worked for symptom control, but they were not identical structure to the human body's own. Later on, as the technology developed, we could produce hormones that are identical in structure to the human body's own.

But the fact that both of these things still exist on the market has caused a lot of confusion. And what has propagated the confusion is that even today, quite often we're still talking about hormone replacement therapy as if it's all the same thing. Even though it's an umbrella term for a number of different drugs at different doses and different routes, some bioidentical, most synthetic, we're not making those distinctions and they're really important.

So I think for menopause this has become a big deal because we know that for menopausal women synthetic progestins particularly, have negative impacts on the breasts and on the cardiovascular system that bioidentical progesterone has not been shown to do so.

So that's key. But I think also, when we start to think about the functional medicine side, we are now beginning to want to work with hormones as part of the jigsaw puzzle. Because traditionally, hormones have been either about menopause or about contraception, and we haven't really put very much attention on hormones as part of the bigger picture, such as the hypothalamic pituitary adrenal axis and how that propagates fatigue.

So if we're going to start to look at that we really want to be working with bioidentical hormones because we begin to see that things like cortisol can steal from pregnenolone or progesterone, they can steal from hormones that are identical in structure to the body's own.

So I think bioidentical hormone replacement therapy both refers to the use of hormones that are identical in structure to the body's own. But the doctors that specialize it tend to also be working in a slightly different way, in the sense that they are using a more individualized lens. So they may be using compounding pharmacies to individualize doses for their patients where necessary. And number two, they tend to be looking at hormones as part of a jigsaw puzzle. So that's, I think, the big difference between making standard HRT, which is not making these distinctions and not looking at things in a jigsaw and bioidentical rules.

### **Kirsty Cullen- [00:07:33]**

And you explained the origins of the original synthetic hormones there. What are the origins of bioidentical hormones? What are the sources?

### **Dr. Anu Arasu**

Yes, great questions. So they're plant based, derived from Mexican yam, they're still made in laboratories, it's not just the case you could eat yam to get all the benefits, they are made in the laboratory to be identical in structure to our body's own hormones. And then there's other processes that would make them absorbable, for example, micronized progesterone.

### **Kirsty Cullen**

How might bioidentical hormones then be useful in a Chronic Fatigue picture within a protocol?

### **Dr. Anu Arasu**

Well, if we come back to this idea of Chronic Fatigue being this imbalance between the stressors that the body's exposed to and its ability to handle stress. We begin to see that there are stages that can happen. So in a perfectly functional system, we may have normal levels of cortisol, abnormal levels of DHEA, Dehydroepiandrosterone. In the event of an acute stressor, whether this be an infection, whether this be a psychological stress, maybe somebody is going through a divorce or very stressed at work, in the event of acute stress what we tend to see is a rise in both the cortisol and the DHEA.

If that stress goes on, we may then begin to see a picture where the cortisol is staying elevated, but the DHEA has dropped. That's an imbalance because actually some of the properties of DHEA are to buffer against some of the negatives of too much cortisol, which I'll talk about later.

If the stress then goes on, now we might get to a point where even the cortisol begins to drop. We may start stealing from other hormones to try to keep that cortisol up. But eventually, if that stress goes on, we may get to a stage where the cortisol is also flatlining. By that point, that HPA axis, hypo function, that person is going to be really fatigued. They're going to be really quite burnt out. They may find that they can't exercise. They really can't do very much during the day. And that's flatlining cortisol.

So in each of these stages, they're going to be problems because when we have too much cortisol, what are the things that's going to cause? First of all, it's going to affect our immune system. We are going to notice things like fluid retention. We may notice things like sarcopenia, loss of muscle mass, which is very important even in terms of energy. We may notice that peptide and protein formation from the pituitary gland is inhibited. We also find that it disrupts gut motility.

So this is a really big point because so many of our chronic patients actually have a fermenting gut. They may have, rather than digesting stuff, they fermenting it. And in order to stop fermentation happening, you've got to have a migrating motor complex that's pushing the food and debris through. So if you've got high cortisol levels and that migrating motor complex, which is a parasympathetic

function, if that's not happening the gut's going to be very difficult to heal.

We also see a rise in glucose and that's going to push insulin up perpetually. We're going to get more insulin resistance with all the problems that insulin resistance causes, metabolic syndrome, essentially. And the insulin resistance could do something else. It can actually stop, for example, in women, it can stop ovulation. Why? Because the high insulin stops this lovely LH surge, so it stops the woman from ovulating, and if you're not ovulating, then you're going to start to get imbalances in between your estrogen levels, which are going to be around, and progesterone, which is only produced by ovulation.

So essentially, the next stage is you're in a state of too much to estrogen for the amount of progesterone. And that then starts perpetuating problems because it slows down the thyroid. And you feel even more fatigued, so it makes the adrenal symptoms worse. It can bind up things, so estrogen dominance could be a problem. Plus, we need progesterone because when we're really fatigued, we can start stealing from progesterone to keep our cortisol afloat. So if you don't have any progesterone, that problem is just going to get worse. So we can see how the hormones are actually perpetuating and worsening the state of fatigue.

### **Kirsty Cullen - [00:12:15]**

So as you explained there it's sort of a domino effect almost, that ends up in this self-perpetuation where so many different body systems are involved and so trying to regain that balance is going to be key.

### **Dr. Anu Arasu**

Yes, exactly. Exactly. We want to break that cycle. I think that's the key point.

And again, one of the reasons why it's so important to think about hormones in this functional medicine approach is because traditional medicine that has left hormones to the realm of menopausal fertility, is in a sense forgetting the fact that estrogen and progesterone are involved in cell signaling. You know that they have so many other actions, so breaking that downward spiral is going to be really important.

### **Kirsty Cullen**

And I think one of the interesting points I found in your book was that obviously brain fog, suboptimal cognitive function are really common in ME/CFS. And actually, what's so interesting is that parts of the brain are really rich in oestrogen receptors. So in fact, oestrogen also has a really important role to play in cognitive function. Could you explain a little more about that?

### **Dr. Anu Arasu**

Yes. So, so oestrogen and progesterone, in fact, progesterone is in many trials looking at its use in traumatic brain injury. So oestrogen and progesterone receptors are found everywhere in the body. And they are key for proper cognitive function.

So one way, I have a theory that at the end of glandular burnout, we can almost get a bit of neurotransmitter burnout because we can see from the research that when our hormone levels are high, they prevent the rapid breakdown of neurotransmitters. For example, estrogens impact on the COMT enzyme, Catechol-O-methyltransferase enzyme means that it prevents the rapid breakdown of some of our neurotransmitters. So generally speaking, when we have enough hormones going around, that helps sustain neurotransmitter levels.

When we get, or crashing hormones, for example, after we give birth suddenly our hormones drop through the floor, we can get postnatal depression. At menopause when our hormones are very low, we can feel depressed or fatigued because we're actually losing both the benefits of the hormones and their activity on the receptors in the brain, plus the ability to keep our neurotransmitters afloat. So

this is another big part of things that could go wrong in Chronic Fatigue.

**Kirsty Cullen - [00:14:46]**

And interestingly then shifting focus to testosterone. Of course, symptoms of low testosterone can include things like fatigue, poor concentration, low mood, insomnia, which again are common symptoms within the CFS community.

**Dr. Anu Arasu**

They are. And testosterone is actually a very powerful, well so far, what we've seen from the research is that it has some powerful anti-pain effects. So testosterone is. Yeah. Has all those important roles.

**Kirsty Cullen**

So that seems a good point, actually, to bring in this link between hormone balance and chronic pain. Perhaps you could explain a little more about that for us.

**Dr. Anu Arasu**

Yes, this is a really interesting area of research right now. What we know is that when pain signals are received from anywhere in the body, they will send messages to the hypothalamus, which will trigger the whole axis.

So what's going to happen? The hypothalamus is going to release CRH, GRH thyroid releasing hormone, that is going to trigger the pituitary to release things like FSH, LH, ACTH, TSH. And it's going to trigger the end organs to then produce the key hormones involved in pain.

So what are these going to be? Things like cortisol, pregnenolone, DHEA, oestrogen, progesterone, testosterone, thyroid hormone such as T3 and T4. And, so it makes sense, of course, that pain is going to have a big impact on all of these hormones. And what the early clinical experience is showing is that measuring hormone balance can actually be a very effective biomarker for pain. And what we're beginning to see is that if you correct hormone imbalances, we may even be able to get away with lower levels of painkillers. So lower use of opiates and those kind of medications.

And the second really important part of that research that is just coming out is that without correcting the underlying hormone imbalances and addressing this part as well, we may never achieve adequate pain control. So I think we're at very early stages here and there's a lot we don't know about pain. But these are two really, really important things and it's very exciting fields to be looking into.

**Kirsty Cullen**

It is exciting because fundamentally then by improving hormone balance, we're relieving sort of a need to take painkillers, painkilling medication, which, of course can have such a detrimental impact on the gut flora and the gastrointestinal system. So it brings in a whole other functional system there.

**Dr. Anu Arasu**

Exactly.

**Kirsty Cullen**

Am I right in thinking that testosterone therapy is also associated from an inflammatory perspective? Because we may see that there may be a reduction in inflammation, CRP which is a specific marker of inflammation following testosterone therapy?

### **Dr. Anu Arasu - [00:17:40]**

Yes, we have seen improvements in, as we say, inflammatory markers and things like insulin resistance with testosterone therapy. And this comes back to the idea of the hormones being cell signalers more than, they have so many roles in the body.

And in a sense we are always competing between an anabolic state and a catabolic state, spending the first half of our lives in a more anabolic state where we have the steroid hormone sort of building us up. And aging the aging process is in sense a catabolic state. It is the breakdown, the loss of hormones, which is classically marked by increasing sarcopenia, increasing loss of muscle mass, increasing inflammation and increasing insulin resistance. So that is the, we want to be tipping away from those things. That's the fundamental part.

### **Kirsty Cullen**

A fascinating era of research. I will be watching with interest because obviously pain management and inflammation are so central to the ME/CFS picture and something that we're constantly working on with patients, with clients in clinic to try and improve for them, isn't it?

### **Dr. Anu Arasu**

Yes. Yes. It's the key foundation.

### **Kirsty Cullen**

So let's talk strategies a little bit, Dr. Arasu, what strategies can people use to improve their hormonal balance? What type of recommendations would you make?

### **Dr. Anu Arasu**

I think there's so much that we can all do ourselves, and I think if we want, we're on a health journey, this is the idea, our body is sending us messages, it's sending us signals that something needs to change. So where are the areas that someone's going to look?

First of all, I'm going to put sleep right up there. I think sleep is fundamental. This idea of being asleep before 11pm, the adrenal glands do recharge between 11pm and 3am. So we want to be asleep before 11am. Getting your 8 hours a night if you can. And we wake up trying to respect the natural circadian rhythms, so getting natural light first thing in the morning, because this is going to help pineal gland production of melatonin later on in the day. It's things like being indoors and seeing too many blue lights from the screens, so having a lot of artificial light that can disrupt our own melatonin production.

I think the second thing to really put up there is about diet and stable blood sugars. So, probably all patients who have been on a Chronic Fatigue journey are already working incredibly hard at this. We know that the gut plays such an important part, whether that be through blood sugar imbalance and episodes of hypoglycemia or whether that be through allergy mediated responses to some types of food.

So these are the two things that probably most fatigue sufferers have to look out for. To keep stable blood sugars we want to be using a more ketogenic, i.e. high fiber, high fat, normal protein, lower GI type diet because you're going to avoid that blood sugar rollercoaster. If you are having spikes in your sugar, that then cause insulin secretion, pack away the sugar and then you've got a hypo. If you're on that rollercoaster, this is going to tax, going to put some stress on your hormones to try to keep on bringing up and balancing those blood sugars. It's going to cause a lot of fatigue.

And of course, depending on where someone is on their journey, how they eat, what they're able to eat, if they have to snack every few hours that's all going to depend on where someone is. So there's nothing, there's no blanket advice for everybody out there. But these are some of the principles.

## [00:21:27]

And the second thing is really about food intolerances, whether these be some of the top allergens that we're finding, such as wheat, dairy, soy, egg, peanuts, these would be some of the top 5 allergies. If the body's having an immune response to those, then if there are [inaudible] being produced, say for example, if somebody is beginning to produce histamine to histamine containing foods, now all of this is going to have a huge impact on your cortisol. It's going to then go throw your hormones off.

So I think diet is a really big thing to look at and probably depending on your symptoms, it may also be working with a practitioner to investigate what's going on in the gut with confidence of stool tests or tests for fermenting gut.

The other things to say for hormone imbalance are to really clear up and try to remove all the primary stressors in your life. Whether that be about changing of work, sorting out the boundaries around a relationship, making these changes, making the time and space for pacing, because essentially in Chronic Fatigue we know that it's an imbalance between what the body's being exposed to and what it can actually handle. So if you begin to listen to your body, get an idea of what you can handle in the day and then cut it down, doing 70, 80 percent of that, that is a good place to be. Because otherwise you're flying very close, sailing very close to the wind, you know, walking very close to the cliff edge. And it's quite easy to fall off. And that takes its toll on the whole and it can take longer to recover.

I think these are some fundamental parts. Supplementation again, so we know that certain things, such as cortisol use up magnesium, so many patients would benefit from taking extra magnesium, so at least 400 milligrams a day. We know that things like vitamin C, I mean the adrenals are the glands that use some of the most vitamin C, so taking good amounts of vitamin C is going to be helpful for that also for the gut.

Again, some of the B vitamins, B3, B5, B6 are particularly important, but I would say all the B vitamins, a good B complex is going to be key for adrenal function. Then there are adaptogenic herbs that can have a role, maybe working with a practitioner to understand what exactly they need.

Finally, I suppose the last maybe big, bigger piece of this picture is really going back to childhood and to really look at all the factors in our lives. If someone has had trauma, we know from research like the Adverse Childhood Episodes research that this has a huge impact on morbidity and mortality across the spectrum.

So actually, one of the things that trauma can do is it can reset our whole hypothalamic pituitary adrenal axis. We can suddenly be in a state where the baseline, the normal point is set too high. So if that's the case, then it's going to be a bit of a process. But really, things like meditation, breath work, practices such as yoga as well as doing the therapy, taking the time you need to try to understand some of these things is going to be a helpful part of the picture. So I think that these are all things that people can be doing by themselves before even working with a practitioner.

## **Kirsty Cullen**

Fantastic. And with regards to more clinical work, what type of testing might you carry out clinically to assess hormone balance for clients that visit you?

## **Dr. Anu Arasu**

Yes, good question. So we have things like the DUTCH test, which is a urine test that looks at hormone levels, as well as how the body metabolizes those hormones. So it will give you an idea of which pathway you metabolize your oestrogen down. The 2 hydroxy pathway, 4 hydroxy, or the 16 hydroxy pathway, some of which are more favorable than others.

And it also is going to give you an idea of your cortisol. It's going to show cortisol at points throughout the day. So you're going to get an idea of the shape of the cortisol because one of the earliest signs of dysfunction may just be a change in the shape. It may just be that you've lost that nice peak in the morning and instead you're getting a tip up at the end of the day. So you're getting it reversed, but it

should be nice and high in the morning and low at night. Now you're beginning to see it's a bit low in the morning and higher at night. So we're going to see the shape of the cortisol in the DUTCH test. We're also going to see how you metabolize your cortisol and whether you break it down into cortisol or cortisone metabolites.

The DUTCH test also gives other information, such as markers of oxidative stress. So when we're talking about the insults of environmental toxins, pollution, chemicals in the environment, that's going to show up in perhaps the body's ability to handle that. Its ability to cope with oxidative stress.

The DUTCH test does also show things like melatonin levels. So if somebody is not sleeping and they've got melatonin, low melatonin, taking melatonin can be really beneficial because it can break that cycle. And then when they can start sleep again, they can stop taking it.

So the DUTCH test is a great test. I mean blood tests are also very useful. And the blood test will have other things that the DUTCH test may not. They may have the follicle stimulating hormone that gives us an idea of how hard the brain is working to kick the ovaries, for example, to produce hormones. So if someone has lost their periods, we'd want to probably work out why. And at that point, the FSH is going to be a really important test.

So these are probably the first hormonal tests that I would talk about. Then of course for the thyroid we're going to want to be looking at TSH, T4, T3, thyroid antibodies and in some cases reversed T3. Because another thing that can happen, I didn't talk so much about, was that if we have high cortisol, we have cortisol dysfunction, our body can try to put us into hibernation and it can start to shunt T3 into its inactive form to slow us down. So that's another thing that can be a useful test to see.

### **Kirsty Cullen - 100:28:05**

And just going back to the DUTCH test, just for listeners, it's interesting to know we have a case study session with my colleague Sanna Anderson, where we break down a DUTCH test and some results and just walk through those and explain how useful they are. So that sort of seems relevant to bring in here.

Dr. Arasu, you mentioned the importance of individualization of protocols with bioidentical hormones. So not a one size fits all process. So I thought it would be interesting maybe just to explain what that looks like in terms of practical clinical applications. So once we've done testing, once we've assessed that maybe some support is required, is there ongoing clinical review needed to look at what level of support is required over ongoing months?

### **Dr. Anu Arasu**

Definitely, yes. I mean, really you want to be getting a baseline and then you want to be treating and going off both symptoms and retesting, but definitely want to be monitoring it.

So, and this is why I would say that in a sense there are two parts of the story, there's the actual type of hormone that you're using, and bioidentical versus synthetic, but then we have bioidentical hormones that are fixed doses, and that's fine. But we really want to be using this philosophy, this way of approaching it, that is looking at hormones as part of the bigger picture.

And that's where individualization can be very helpful because there are so many women out there. I mean, for example, we'll take the example of, say, young women that have lost their periods, now we want to be giving them their periods back. But if they just take the pill, it's going to be, it's not really going to be doing, because although they're going to get a withdrawal bleed every month, it's going to be fake withdrawal bleed. It's suppressing their own ovaries, just giving them a bleed every month. It's not the best thing they could be taking for the bones, a bioidentical hormones would be better. And it's not really allowing their own ovaries a chance to wake up and do it themselves.

So I think that in that case, what you may do is you may test a woman's hormones. You may see is she low on just progesterone, but she still has good oestrogen levels, in which case she may only need



progesterone. Is she low on both estrogen and progesterone? In which case she needs both. Then if her ovaries wake up, can we test? Can we stop one? Can we stop both? How do we ensure that the periods continue? What's her weight like? What's her bone density like?

This is where we begin to see how useful it is to test and to treat individually as opposed to just look from the outside and think we could give one thing, the same thing to everybody, which is the pill, which kind of does a part of the job, it doesn't get to the underlying cause as to why she's lost the periods in the first place or whether or not her own periods have come back. And this poor girl may be left wondering, well if I stop taking this pill, will I be back to square one or has my body actually improved? So I think that's a good example of the difference.

### **Kirsty Cullen - [00:31:12]**

Because, of course, fundamentally, the endocrine system is a big feedback loop in many senses, isn't it? So we produce a hormone and then we have a feedback signal which tells us to stop producing so much if there's an overproduction. So I'm interested to know how the supply of bioidentical hormones plays into that feedback loop?

### **Dr. Anu Arasu**

Yeah, well, it's not just about negative feedback. A lot of what the hormones do is about homeostasis. Right. So, for the example, I've just given, imagine somebody is over exercising and under eating. Their cortisol shoots up, it stops their luteinizing hormone surge, it stops them ovulating, it stops their periods or their periods come every few months only. Right, now in that case, breaking the cycle can actually quicken the recovery process, because we give back some oestrogen and progesterone, the body in a sense, calms down and can modulate against the high cortisol, it may help the body to relax and to produce some of its own.

Now, that doesn't mean that we don't need to fix the under eating and over exercising, we absolutely do. But it's about breaking that cycle and giving out the right signals, because if somebody is in a spiral where they are stressed and they're not sleeping and then they're not sleeping and etc, etc, etc, you want to be, if you give progesterone, that may help them calm, it may help them sleep at night. That's already going to lower their cortisol for the next day.

So this is an interesting way to see it as more of a dance. And as something from which we can either be spiraling upwards or you can be spiraling downward. And if you're spiraling downwards, what can we do to actually stop that process? And I think so many Chronic Fatigue sufferers are going to relate to this because, you know, it doesn't just stay the same. It's not just the case that you're fatigued and then that's how it is. I mean, it's a changing picture and it's going one way or the other. So you really want to be breaking the pattern and spiraling upwards.

### **Kirsty Cullen**

And the ultimate goal, as you say, is to support homeostasis, a perfect balance within the body. But that's a dynamic situation, isn't it?

### **Dr. Anu Arasu**

A dynamic situation exactly. So sometimes it's about moving the processes back towards the homeostasis and it takes time. But then we get there.

### **Kirsty Cullen**

Dr. Arasu that's been fascinating. Thank you so much for explaining that to us. If people would like to read more about your work or about this topic, where can we direct them to?

**Dr. Anu Arasu**

My website, [londonbioidenticalhormones.com](http://londonbioidenticalhormones.com) has some blogs on it. The book is quite a good summary just of the basic differences between bioidentical hormones and synthetic. And yeah, I think those would be two good places to start.

**Kirsty Cullen**

Wonderful. Thank you so much for joining us today.

**Dr. Anu Arasu**

Thanks a lot.