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[www.twitter.com/HealthHitsPod](https://www.twitter.com/HealthHitsPod)

[HealthHitsPod@gmail.com](mailto:HealthHitsPod@gmail.com)



Hello and welcome to the Health Hits podcast.

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Today's episode is all about vitamin D.

We live in exciting times.

We have known for decades that profoundly low vitamin D intake can be associated with bone disorders such as rickets.

But it's only now that we are coming to realise the impact that even slightly low vitamin D levels can have on the body. Some studies suggest that up to 50% of the world's population has some degree of vitamin D deficiency, and even in its mildest form it can cause fatigue, aches and pains and low mood.

Every year, GPs in the UK see hundreds of thousands of exhausted patients, and for some of them all that is needed is a simple daily vitamin D supplement.

But more than that, very recent studies have shown a link between low vitamin D levels and breast cancer, depression, and heart attacks.

We'll work through what vitamin D is and where it comes from, what happens when we are low in it, as well as the latest evidence behind supplementation.

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So Vitamin D.

First of all what is a vitamin?

A vitamin is a compound that is essential for normal body function, but which has to come from the diet because we can't make it in our own bodies.

Vitamin C is a great example, and one that has been understood for centuries. It's present in many fruits and vegetables and is essential to the making of collagen, an important protein in forming the structure of our cells.

Without it the body can't repair wounds and is prone to bleeding. Deficiency is called scurvy and sailors in the middle ages, on ships for weeks or months on end, would start to develop these symptoms.

Since the body can't make its own vitamin C, the cure was simply to introduce citrus fruits to their diet and the problems went away.

Coming back to vitamin D, the most interesting thing to say about it is that it isn't strictly a vitamin. It doesn't have to come in the diet, our bodies are actually capable of making it.

There are small amounts of vitamin D present in oily fish and egg yolks, but the majority of the vitamin D we have in our bodies has been made in the skin.

We can make a precursor to vitamin D ourselves, but it is the Ultraviolet B waves in sunlight that are required to transform this into the active vitamin D.

So in the strictest description we would call it a hormone rather than a vitamin.

The fact we rely on sunlight to synthesise vitamin D is essentially the root of the current pandemic.

The fossils of the first anatomically modern humans are nearly 200,000 years old. This was before humans invented the wheel, the space shuttle, and eggplant emoji. Humans back then had very different lifestyles. They were outside most of the time, and even if they did build shelters or slept in caves, they would have been forced to spend large parts of the daylight hours out hunting and gathering.

Today, most of us spend most of our days inside, working in an office and commuting in a car, train or bus.

And when we do go outside our clothes block the sunlight and those with lighter skin wear sunscreen to guard against some of the harmful effects of UV rays,

So it's not surprising that our production of vitamin D has dropped in the last few hundred years or so.

In fact I would say that even beyond this there are many stresses in modern life which our brains and bodies are not evolved to adequately deal with.

Even back in the 1940s milk in Britain was being fortified with Vitamin D. This was to combat the rise of Rickets, the complication of extreme vitamin D deficiency.

Rickets is a disease of childhood where low vitamin D levels lead to softening and weakening of the bones often resulting in bending, giving you that characteristic bowed legged appearance.

Although British doctors now only see Rickets in 0.003% of children, we still see a lot of parents worried about their children's legs.

Bowed leggedness is actually a normal stage of leg growth in children, until around the age of 2, then the knees start to move together towards a more knock-kneed appearance at its most extreme between 3 and 4. Then the knees start to straighten up to adult angles by about 6 or 7. Knowing what to expect can be very reassuring, and of course if the angle of the knees is moving the wrong way for the age, or they are not symmetrical then it needs to be addressed.

The day to date experience I have with vitamin D deficiency is nothing to do with rickets but rather that vague sense of fatigue, low mood, achiness, that patients describe.

When patients present with these symptoms, the usual things we look at are signs of anaemia, iron deficiency, liver or kidney problems. The thyroid gland playing up. Diabetes. B12 deficiency.

But it's only recently that we have been more seriously considering low vitamin D as a cause of these symptoms.

What constitutes normal levels of vitamin D is still up for debate. Even NICE, the national institute for health and care excellence in the UK can't decide, even after having reviewed the many many papers published in the last 10 years.

The UK based Scientific Advisory Committee on Nutrition published an extensive paper in 2016 suggesting recommendations for daily intake of vitamin D and the thresholds for levels considered to be "deficiency".

The truth is no one is certain what levels are appropriate for preventing disease, and this is made much more difficult due to the fact that symptoms such as fatigue, aches and pains and low mood are so common, and often have multiple factors involved. They are also vague and so a reliable trial is very hard to construct.

There have been several papers published this year with reasonable high patient numbers that show vitamin D levels seem to be lower in patients with aggressive breast cancers and those that have had heart attacks.

From my clinical observations over the years I have seen hundreds of patients with vague symptoms and a slightly low vitamin D that have had significant improvements after starting a low dose vitamin D supplement.

When patients tell you that it's the best they've felt in years, and that they can climb over fences they used to have to walk round it makes you sit up and take notice.

Public Health England now recommends that everybody takes a vitamin D supplement, particularly over the autumn and winter months which is a time of the year in England where the sun is known not to be powerful enough for us to synthesise vitamin D, even if we brave the cold and expose our skin to it.

Vitamin D can be measured in units but also by weight, so depending on where you get your tablets, you will be looking for a recommended dose of 400 units or 10 micrograms a day.

They cost around 4-5 pence per day, and can be bought from any pharmacy.

I was interested to find where the vitamin D in my tablets actually comes from, and that in itself is fascinating.

The vitamin D found in supplements is usually D3. It comes from lanolin, which is an oil produced in the skin of sheep that is held in their wool. It can be obtained by squeezing the wool to isolate a concentrated waxy substance.

This concentrated lanolin contains the same vitamin D precursor humans can make, and when its exposed to UV light the same thing happens as in human skin, the precursor turns into vitamin D3.

Because it comes from wool it is not considered vegan, but there is a way of isolating a vitamin D2 from plant matter.

The problem is that a trial published this month has shown that vitamin D2 is not absorbed nearly as well in the gut, and so vitamin D3, the one from the sheep's wool is at least twice as effective.

It wasn't long ago that doctors dismissed vitamin D as faddy nonsense, but more and more trials are showing that more people than ever imagined are low in vitamin D, and that supplementation makes a difference in an huge range of conditions.

More and more public health bodies are recognising this, and if it were possible to buy shares in Vitamin D then I would because its clear to me that a daily supplement of 10 micrograms a day can improve the lives of tens of millions of people around the world.

I hope you have found this episode interesting and useful. I generally practice what I preach and you will find a box of vitamin D tablets in my kitchen next to my breakfast cereal. I will leave links to the latest evidence behind the use of vitamin D and recommended doses on the site, [www.HealthHits.info](http://www.HealthHits.info) and you can follow me on twitter or facebook, @HealthHitsPod.

I've got some exciting episodes coming up, so please keep listening to Health Hits.