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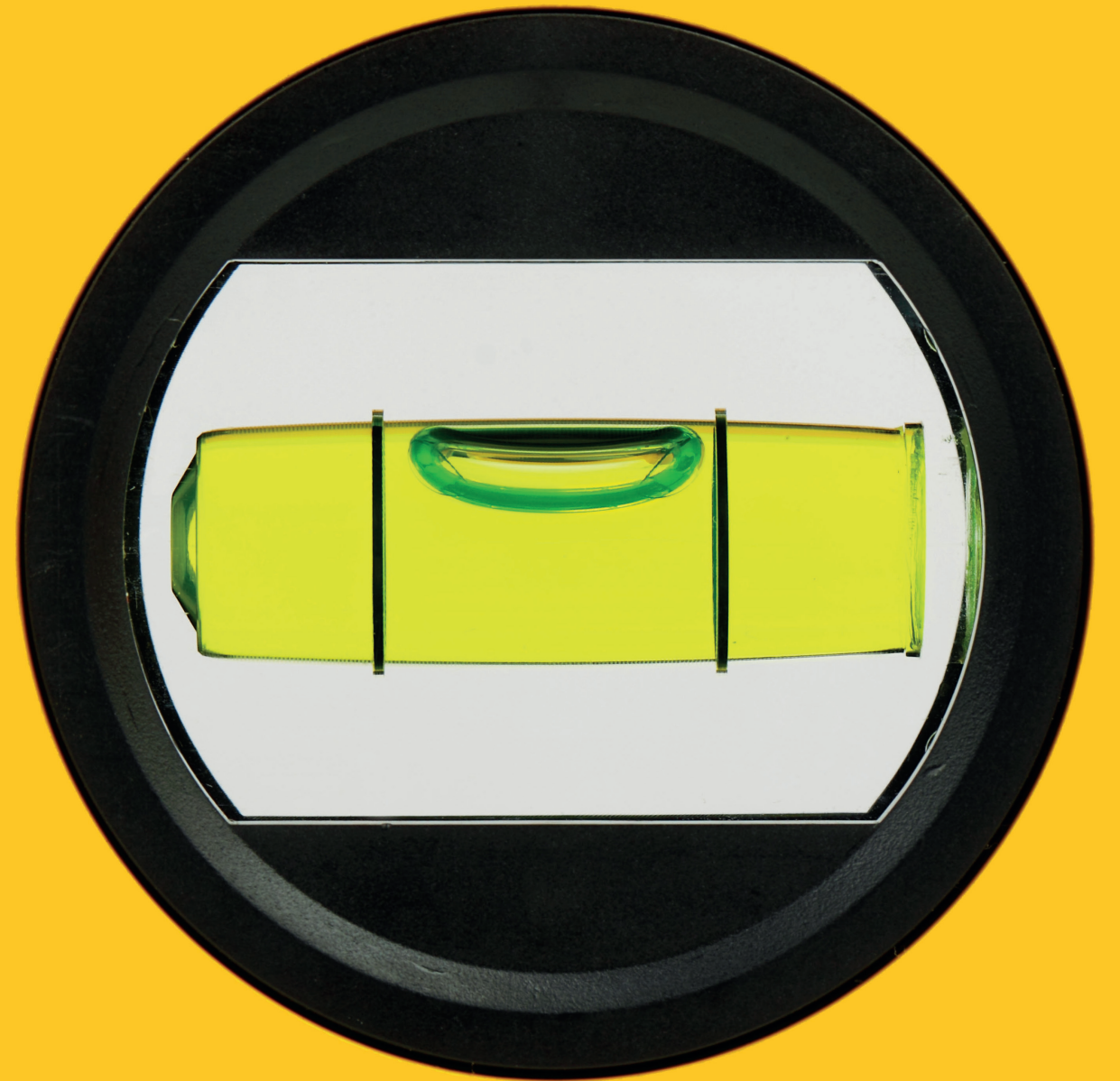
CONTINUOUS GLUCOSE MONITORING WEARABLES ARE ON

YOUR

THE RISE, BUT WHAT INSIGHT DO THEY ACTUALLY PROVIDE?

LEVEL

CHARLIE ALLENBY BREAKS DOWN ALL THINGS BLOOD SUGAR »»



ver the last decade, there's a good chance you'll have become the wearer of a piece of health-tracking tech. Heart rate monitors are built into even the most unsuspecting watches, while it's common to be bombarded with a smorgasbord of steps, sleep and SpO2 readings on a daily basis.

Data tracking is no longer limited to the skin's surface, though. The future of wearables is implanted, and continuous glucose monitors (CGMs) are one of the first tools to have made the jump to the mainstream.

The various models currently available make bold, flashy claims about providing real-time tracking of how your lifestyle impacts your blood sugar levels, as well as recommendations that will have a transformative effect on your day-to-day life, training performance and long-term health.

But what is a CGM? And can tracking your blood sugar really be so revolutionary?

More than a monitor

A CGM is a small, puck-like device that's implanted into your arm or abdomen. It features a small sensor that pierces the skin and takes readings of the amount of sugar in your interstitial fluid (the fluid in between your cells that isn't blood). This information is transmitted wirelessly to an app on a smartphone. It works in a similar way to a traditional blood glucose monitor, where you have to prick your finger to get a sample. A CGM is an upgrade, though, because it provides a constant, real-time reading and not just a one-off result – hence the continuous in its name.

Originally aimed at diabetics, where high or low blood sugar levels can have serious consequences, a CGM's ability to reveal what's going on under the skin in terms of blood sugar levels can also take some of the guesswork out of nutrition for the wider community, too.

The sweet stuff

If you're picturing little grains of granulated sugar swirling around your body, it's not as literal as that. Blood sugar, or glucose as it is otherwise known, is one of the human body's main energy sources.

"Glucose is inherently part of the metabolic system," explains Josh Clemente, founder of CGM device Levels Health. "Metabolism is the means by which our cells take our food and our environmental factors, and translate them into energy. Essentially, glucose is a carbohydrate broken down in the bloodstream and released as a simple sugar. Hormones let that sugar into a cell, where it can be broken down, combined in the presence of oxygen and turned into ATP, which is used for energy."

Almost all forms of food and drink contain some level of sugar in them, and any that isn't used by the body immediately gets saved for later.

"Glucose is stored either in the skeletal muscle or the liver as glycogen," adds Dr Richard Allison, performance nutritionist and clinical dietician at the Institute of Sport, Exercise and Health. "That can be used at a later date when you're either exercising or not exercising,

depending on what the rest of your day looks like in terms of what you have eaten."

In its raw form, glucose is a high-intensity energy source, so it's important for the human body to keep it within a controlled range in the bloodstream. If its concentration gets too high, your body pulls some levers – your heart rate increases, stress hormone (cortisol) elevates and kidneys go into overdrive – to try and get it down again. "Most importantly, it releases a very large spike in a hormone called insulin," says Clemente. "Insulin is the key that unlocks the cell to let glucose in."

When glucose is high, the body produces insulin, and that insulin instructs the cells to use it for energy or store it as fat. In the UK, blood glucose is recorded in mmol/L (in the US, it's mg/dL), and a reading under 7mmol/L (126 mg/dL) after fastening for a couple of hours beforehand is considered normal and healthy. Consuming anything will cause this number to rise (which is why tests are generally done when fasted), before it returns to something of a baseline. The introduction of a CGM into the mix, though, enables you to see what those

rises look like in real time, how your blood glucose levels react to different foods, and whether you're encountering spikes and dips.

Peaks and troughs

It's likely that you will have experienced the symptoms of a spike and the subsequent crash – for example, a carb-heavy lunch followed by a lull in a late-afternoon work meeting. While spikes are sometimes needed, particularly if you're refuelling immediately after exercise, most of the time they can lead to instability in your blood glucose levels.

"There are situations where they're not useful and considered to be bad," says Allison. "They can have an impact on simple things, such as mood. It can actually depress or suppress the release of glucose later and then potentially impede your glucose control. Often when you have these spikes, you also have the rebound, so you have the drop off and low blood sugar."

The detrimental effects aren't limited to the short-term, either. When spikes go too high, they cause glycation – when glucose binds to proteins and fats that it's not supposed to, destroying their ability to function and hardening them. "The more frequently we're

spiking our blood sugar, the more we are producing glycation," explains Clemente. "In our vascular system, this drives the development of atherosclerosis [the hardening of arteries] and is part of the reason why people who have high blood sugar over long time periods are substantially more likely to get disease caused by blood vessel damage – heart disease, stroke, Alzheimer's disease."

If you're constantly spiking your blood glucose levels, it can also impact your body's response to one of its glucose control levers – insulin. "Insulin levels



A CGM like the one used by Levels Health (here) will transmit information wirelessly to an app on your smartphone

"A CGM WORKS IN A SIMILAR WAY TO A TRADITIONAL BLOOD GLUCOSE MONITOR, WHERE YOU HAVE TO PRICK YOUR FINGER TO GET A SAMPLE"

start to drift upwards over time, so the baseline level doesn't return to its normal state," adds Clemente. "Cells start to become numb to the signal of insulin and de-emphasise responding to it. This is a state that eventually becomes known as type two diabetes, which is essentially where the body can no longer control the glucose that's being introduced, because its insulin system has become very numb."

Do sweat it

While all of that might sound pretty scary and you're now thinking of skipping your mid-morning sweet treat, there is another trick your body has up its sleeve in terms of controlling its glucose levels – exercise.

"Any sort of exercise – whether it's strength training, a casual walk around the block or high-intensity interval training – improves insulin sensitivity," says Clemente. When you're exercising, your body doesn't need to produce insulin in order for your muscles to use glucose – it just taps into its glycogen stores. "Typically, if you exercise, your blood glucose goes down," adds Allison.

It's a two-way relationship, though. As glucose is one of the body's main energy sources, your blood glucose levels can have a big impact on sporting performance, particularly during cardio-based workouts.

"You want it to rise to an optimal level before you actually start your exercise," explains Allison. "Low blood sugars are probably more commonly known and this is often referred to in endurance athlete terms as a 'bonk', where you have low blood glucose levels and basically don't have the fuel to be

able to exercise or compete. If your body is running out of that stored carbohydrate – the muscle glycogen – you often get a rapid increase in heart rate and sweating, and it may also cause collapse and dizziness."

It is possible for your levels to be too high, though. "High blood sugars

are often associated with low oxygen consumption during those aerobic activities, so can have a detrimental impact on your aerobic performance," adds Allison. "There is a body of research showing that it can also prevent or attenuate muscle growth. The caveat here is I'd encourage anyone who does have diabetes to seek specific or individualised advice."

When it comes to strength training, Allison says that there's no research to show that high or low blood glucose levels have a significant impact on performance in terms of the amount that someone can lift, but concludes that it's still something to be aware of from a long-term health perspective.

Food for thought

The obvious way to minimise spikes would be to avoid simple sugars (classic

“ANY SORT OF EXERCISE – WHETHER IT’S STRENGTH TRAINING, A CASUAL WALK AROUND THE BLOCK OR HIGH-INTENSITY INTERVAL TRAINING – IMPROVES INSULIN SENSITIVITY”



Avoiding simple sugars is an obvious way to avoid spikes

table sugar) that is added or included when a food is processed, in favour of whole, natural food and complex carbohydrates, which the body takes longer to break down, keeping glucose levels at a gradual rise rather than a spike. But it's not that straightforward.

"It's very personal," says Allison. "If you or I both ate a banana, I might get a nice gradual rise over time, whereas

you might have a spike over a 15-minute window. There are a number of factors that are responsible, but most of the research is looking at the gut microbiome – the bacteria that's in your gut – which has a big impact on the way that your body responds to the food that you eat."

Clemente adds that it goes beyond genetics, too, with a study conducted by King's College London showing that

even twins experienced a wide variation of blood responses when eating the same meals:

"There are some universal variables, which is that less added sugar is going to affect us in a positive way – it will reduce the amount of glucose spike that we see – but beyond that, determining what our ideal diet is for our body requires a little bit more

interpretation and there really is no one size fits all.”

A silver bullet?

In this environment, it’s easy to see the appeal of a CGM. Devices like Levels Health can provide a real-time dashboard of your blood glucose levels, helping you get an understanding of what causes spikes. Also, if you do a long-distance endurance event, such as a marathon or Ironman, it can show when you could benefit from a mid-race glucose top-up, to prevent hitting the wall.

Clemente adds this tool shouldn’t be used to eliminate spike-causing foods, but rather to provide context. “I encourage people to start by just experimenting, trying a wide range of different foods in the portions that you typically eat, and see how your body’s responding. We

then have recommendations on the levers you can pull to improve your response.”

Sadly, CGMs aren’t free and most companies use a subscription-based model, where you get sent sensors and access to an app for a monthly fee. When there are already a whole host of expenses when it comes to exercise – from gym fees to new kit – is it possible to justify one more outlay?

“If they were free, I’d definitely encourage people to wear them quite frequently,” says Allison, who has trialled a CGM device himself. “It becomes very useful for endurance athletes: you’ve got that



live data, and you’re able to fuel accordingly.” He adds that if you’re an elite athlete, you can look at those finite changes and marginal gains, but that it’s possible to gain some insight even if you’re completing an event or sport rather than competing.

“The information I gained from wearing one for two weeks has actually made me change some of my choices,” he says. “For example, I was surprised at how quickly I spiked with a banana. Would I have it before, say, a pre-run or pre-bike session? Absolutely,

if that’s what it’s there for. But I would no longer eat one as a snack.”

6 WAYS TO LOWER BLOOD SUGAR NATURALLY

01. Skip the sweet stuff

Swerve adding sugar to things like hot tea and coffee, to minimise self-inflicted blood glucose spikes.



02. Switch to wholefoods

If a food isn’t in its original state – for example, apple juice rather than an apple – there’s a good chance sugar has been added as a preservative during processing.



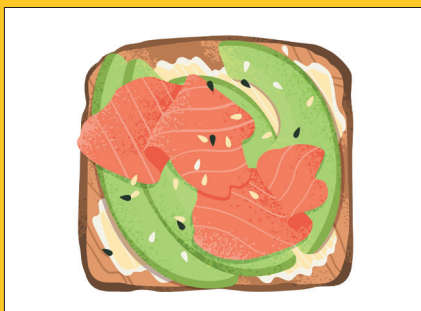
03. Opt for wholegrain

Brown is better when it comes to carbohydrates like pasta, rice and bread. Its fibre content means it takes longer to digest, slowing down the release of sugars.



04. Don’t eat in isolation

Combining carbohydrates with proteins and fats can have a positive impact on blood glucose levels, reducing the response and turning a spike into a gradual rise.



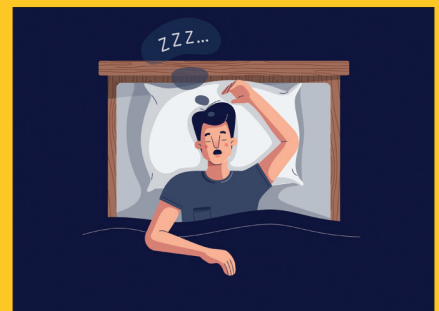
05. Walk it out

Exercise is an insulin-free way of lowering blood glucose levels, but it doesn’t have to be a HIIT session to be effective. Even a post-meal stroll can move things in the right direction.



06. Get some shut-eye

Irregular sleep patterns can have a big impact on glucose intolerance. Minimise the late nights and extended lie-ins to keep your system sharp.



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