

Sitting down is **KILLING** you! Heart disease, obesity, depression and crumbling bones - a terrifying new book by a top doctor reveals they are all linked to the hours we spend in chairs

By [Professor James A. Levine](#)

Published: 00:38 GMT, 26 July 2014 | Updated: 14:12 GMT, 26 July 2014

Uncomfortable reading: Sitting down is one of the worst things you can possibly do for your health

Are you sitting comfortably? Then let us begin — by saying that this is one of the worst things you can possibly do for your health.

So please do yourself a big favour. Try getting out of your seat and reading this (computer screen) standing up. This may feel awkward, even downright strange at first, but it will help improve your health and even make you live longer.

How do I know? Because for the past 25 years, as a British doctor and scientist working first in London and now the U.S., I've been studying the science of sitting.

At the start of my research, which focused on obesity, some fellow scientists dismissed my work as wrong-headed and irrelevant. One rival even wrote to my boss at America's prestigious Mayo Clinic, accusing me of being psychiatrically deranged.

That's all changed now. Indeed, almost every week there are chilling scientific discoveries about the peril of parking our ever-expanding bottoms on chairs.

The sad truth is that most people in the UK — as well as other countries in the West — are slowly dying from what I call 'the sitting disease'. One professor has even worked out from statistical analysis that chairs kill more people than smoking.

Take diabetes. A group of scientists at the Mayo Clinic decided to measure the spikes in blood sugar that most of us get after eating a meal — then looked at what happened when people either sat still or got up to move around.

The result of the study was startling. If a person stayed sitting down after a meal, their blood sugar peaked like a mountain for around two hours.

If, on the other hand, they took a 15-minute walk at just 1 mph after a meal, their blood sugar peaks were halved.

In other words, you can lower the high blood-sugar levels that often lead to diabetes by simply taking a short stroll after a meal.



As my colleague Chinmay Manohar explains: 'When we sit all day, surplus fuel [sugar] is washing around the bloodstream like a massive oil slick in the ocean. That's why we think a third of the population has elevated blood sugar called pre-diabetes, and one in ten adults actually has diabetes.'

Diabetes is just one of the many diseases that scientists have linked to too much sitting. In another experiment, U.S. physiologist Mark Hamilton discovered that sitters are prone to very high levels of triglycerides, one of the components of 'bad' cholesterol.

Indeed, he found that when a person with an acceptable cholesterol count starts sitting for hours at a time, they soon develop very high levels of these triglycerides — so high they vastly increase the risk of heart disease and hardening of the arteries.

Delving further, Hamilton measured thousands of genes from rats' muscles, and found that sitting was associated with multiple gene changes in the muscle cells.



The sad truth is that most people in the UK - as well as other countries in the West - are slowly dying from what I call 'the sitting disease'

In essence, fundamental changes in biology occur if you sit for too long.

Other research from around the globe came up with similar results. Swedish scientists, for instance, discovered that the more you sit, the greater your risk of a heart attack. German studies revealed that excessive sitting softens the skeleton.

Add to that a mass of research that provides a direct link to osteoporosis, cancer of the breast and prostate, depression, back pain, hypertension and obesity, and you'll understand why I've made it my life's mission to get people out of their chairs.

The figures are terrifying: for every hour that you remain rooted in your chair, you can expect to lose two hours of your life — that's two hours lost for ever. Furthermore, too much sitting will make your brain sluggish.

Ever wondered, for instance, why you sometimes get an urge to surf the internet in the mid-afternoon at work? It's because your lack of physical activity impairs cognitive function and makes your mind wander.

Yet still most of us slouch from bed to car, to work seat to sofa — where we while away the hours watching TV. Like the alcoholic thirsting for another Scotch, we've become chair addicts with a constant craving to sit.

Society has adapted by making it even easier for couch potatoes. Instead of using our legs to go shopping, for instance, many of us just click on a computer mouse.

'Society has adapted by making it even easier for couch potatoes. Instead of using our legs to go shopping, for instance, many of us just click on a computer mouse'

Theatre and cinema seats have become softer and wider. In the U.S., no one even bothers to lay pavements in new neighbourhoods, as there'll be no pedestrians to use them.

Typically, we now sit for 13 hours a day, sleep for eight and move for just three.

This is emphatically not what our bodies are designed to do.

For thousands of years, we hunted and grew food; we spent most of our lives upright and sat down only occasionally for a break. Now, however, we've converted from an ancient world of movers to a modern world of sloths. And this has happened in just the past 200 years — ever since the Industrial Revolution brought people flooding into cities.

We all know what followed: increased mechanisation, the invention of the car and the final insult to the human body — the desktop computer.

Now it's estimated that half of people in developed countries work behind a computer screen, shackled to their chairs.

Plus, if you live in a city — and more than half the world's population does — you move only half as much as people who live in agricultural regions.

No wonder so many Britons are vastly overweight: they simply aren't moving anywhere near enough to burn all the calories they eat.

I'm not talking about the fact that most people never go for a run or attend an aerobics class. Even if you go to the gym three times a week, the number of extra calories you burn will probably average a measly 100 a day.

By far the best way of burning calories is all the other movements we should be doing — from walking to work and taking the stairs to dancing or just getting up to turn off the TV.

Indeed, a person who incorporates plenty of these non-exercise movements in his or her daily routine can end up burning an extra 2,000 calories a day.

But how can a typically sedentary human being increase these calorie-burning movements? To find out, I enticed 24 people into my lab and asked them to watch TV, behaving just as they did at home.

Some of them used the remote or turned the pages of the TV guide, but mostly they sat motionless. Predictably, they burned barely any extra calories.

Next, we asked our volunteers to remain in their chairs but deliberately make small movements — by writing or knitting, for example. This pushed up their calorie burn but only by 5 per cent at most.

We then asked them to stand completely still (a 10 per cent rise — not a big calorie burner but a lot better than sitting). Then we asked them to bring in items from home that they typically did something with while they were standing. One man brought in his laundry to fold. A woman brought in a toy cat, which she repeatedly tripped over

in the lab ('This is what happens at home,' she explained).

These types of activities burned up almost double the calories the volunteers had used while standing. And when we finally asked them to start walking at around 2 mph, they actually tripled their calorie burn.

Let's put it this way. If I come home from work at 5pm and watch TV in a stupefied state until 11pm, I'll use only 30 calories in six hours. Alternatively, if I do some basic household chores — such as raking leaves in the garden for a few hours or painting the spare room — I can burn an extra 1,000 calories.

Could lack of non-exercise activity be the reason why some people become obese? I couldn't be sure at this stage of my research, so with two other scientists I devised the 'great gorging experiment'.

Are you a chair addict?

GIVE yourself one point for each 'yes', then tot up the total:

1. Do you work sitting down?
2. Have you ever shopped on the internet?
3. Do you watch TV sitting down for one hour a day or more?
4. Do you ever eat while watching TV or sitting in the car?
5. Have you ever tried internet dating?

Score 0: You don't need to read this article — give it to a friend who might.

Score 1-2: Chair pre-addict.

6. Do you own a recliner armchair?

7. When you go to a party, do you seek out a chair?

8. Is there an imprint of your bottom on your sofa?

9. Is the cost of your sofa greater than the price of your shoe collection?

10. Have you ever engaged in sexual intercourse while in a chair (or fantasised about it)?

Score 3-5: Chair addict.

Score 6-8: Chair imprisoned.

Score 9-10: Most definitely a chairholic.

The idea was to over-feed a group of people the same number of excess calories, then examine why some were predisposed to gain weight while others weren't. We needed 16 non-gym-goers for the statistics but after 18 months we were still one short. So I loosened my belt and became the final volunteer.

For eight weeks, we were overfed by precisely 1,000 extra calories a day — the equivalent of a Big Mac and a milkshake. We continued our normal lives outside the lab.

To assess our body's fuel stores and how they changed with overfeeding, we went through CT scans, X-ray scans and biopsies of our body fat before and after the calorie gorge. To assess calorie-burn before and after the overfeeding period, we had respiratory measurements taken at rest, after eating and after walking.

The result was astounding. Some volunteers had stored almost every single extra calorie as fat — in other words, they'd gained a stone. Others hadn't gained an ounce.

So how had they done it? How on earth can a person be overfed by a total of 56,000 calories and have nothing to show for it?

The answer is what we call NEAT — Non-Exercise Activity Thermogenesis (the energy expended for everything we do that is not sleeping, eating or sports-like exercise).

The people who remained seated for most of the day gained weight, while those who moved around stayed slim.

Some people seemed to have a switch so that when they over-ate — as we all do periodically — their bodies automatically adjusted by moving more. The others were like hibernating squirrels, storing every extra calorie in fat.

As we'd hoped, this study had indeed solved the riddle of why some people are naturally prone to becoming grossly overweight.

It's nothing to do with mysterious glands, I'm afraid. Obesity is the consequence of sitting too much — a sedentariness that resists the body's natural capacity to burn off extra fuel.

I decided to look into this more deeply. For our next study, I recruited two people: an engineer and a scientist. Their challenge? To produce magic underwear with sophisticated sensors that would measure people's movements.

By this method, we were able to map everything that a person did day and night over several weeks.



Ever wondered why you sometimes get an urge to surf the internet in the mid-afternoon at work? It's because your lack of physical activity impairs cognitive function and makes your mind wander (file picture)

The people who agreed to wear our weird Lycra underwear with wires shooting out were non-gym-goers and had desk jobs. All agreed to eat the meals we provided, which gave them the same number of calories every day.

And guess what we discovered? Obese people who live in the same environment as thin people sit more — on average two hours and 15 minutes more per day. After a decade, we'd finally proved that chairs are fattening, and laid the foundation for a new science.

The next logical step was to look at what happened in the brains of sitters.

Already, there were numerous neuroscientific studies that showed the brain was constantly evolving in response to its environment. More recently, it was discovered that certain chemicals made changes in the brain's structure.

Over the next five years, Colleen Novak, a neuroscientist on our team, discovered a whole host of brain chemicals that made us sink into our chairs or propelled us out of them.

Experimenting with rats, she found the obese ones hardly reacted at all when (painlessly) injected with a chemical to make them move, whereas the thin ones danced about.

This was another breakthrough: it meant that the tendency to loaf about was somehow hard-wired into the obese rats' brains.

Further experiments proved that when you force a rat to be inactive, the parts of the brain that make it active start to shrink (the brain is like a muscle — if you don't use it, it shrinks).

How does all this relate to humans? What it means is that the brains of people with a tendency towards obesity don't respond to signals from their muscles or brains that tell them to move. And the more they sit, the fewer signals there are.

Thankfully, however, this doesn't mean that couch potatoes are condemned to a lifetime of sitting around and becoming steadily unhealthier.

The wiring system of the brain — though much of it is laid down at birth — is capable of adapting substantially, even in adulthood.

So even if you've spent most of the past ten years in a chair, your brain will gradually start to change if you get up each day and go for a walk.

It takes about three weeks for the brain to adapt to this new stimulus. Which means that you can vastly improve your health in less than a month.

But watch out! If you give up and start sitting for long periods again, the whole cycle will start again. Your brain and muscles will encourage you to keep sitting — and you'll revert to being terminally chairbound.

n Adapted by Corinna Honan from *Get Up! Why Your Chair Is Killing You* by James Levine, published by Palgrave Macmillan on August 26 at £10.99. To buy it for £9.99 (incl p&p), call 0844 472 4157.

The views expressed in the contents above are those of our users and do not necessarily reflect the views of MailOnline.