THE SCIENCE OF FASTING

For most animals out in the wild, periods of feast and famine are the norm. Our remote ancestors did not often eat four or five meals a day. Instead they would kill, gorge, lie around and then have to go for long periods of time without having anything to eat. Our bodies and our genes were forged in an environment of scarcity, punctuated by the occasional massive blow-out.

These days, of course, things are very different. We eat all the time. Fasting – the voluntary abstaining from eating food – is seen as a rather eccentric, not to mention unhealthy, thing to do. Most of us expect to eat at least three meals a day and have substantial snacks in between. In addition to the meals and the snacks, we also graze; a milky cappuccino here, the odd biscuit there, or maybe a smoothie because it's 'healthier'.

Once upon a time parents told their children not to eat between meals. Those times are long gone. Recent research in the US, which compared the eating habits of 28,000 children and 36,000 adults over the last thirty years, found that the amount of time spent between what

the researchers coyly described as 'eating occasions' has fallen by an average of an hour. In other words, over the last few decades the amount of time we spend 'not eating' has dropped dramatically.[1] In the 1970s, people like my mother would go around four and a half hours without eating, while children like me would be expected to last about four hours between meals. Now it's down to three and a half hours for adults and three hours for children, and that doesn't include all the drinks and nibbles.

The idea that eating little and often is a 'good thing' has partly been driven by snack manufacturers and faddish diet books, but it has also had support from the medical establishment. Their argument is that it is better to eat lots of small meals because that way we are less likely to get hungry and gorge on high-fat junk. I can appreciate the argument, and there have been some studies that suggest there are health benefits to eating small meals regularly, as long as you don't simply end up eating more. Unfortunately, in the real world that's exactly what happens.

In the study I quoted above, they found that compared to 30 years ago, we not only eat around 180 calories a day more in snacks – much of it in the form of milky and fizzey drinks and smoothies – but we also eat more when it comes to our regular meals, up by an average of 120 calories a day.

In other words, snacking doesn't seem to mean that we

eat less at meal times; it just whets the appetite.

Eating throughout the day is now so normal, so much the expected thing to do, that it is almost shocking to suggest there is value in doing the absolute opposite. When I first started fasting I discovered some unexpected things about myself, my attitudes to food and about my beliefs.

- I discovered that I often eat when I don't need to. I do it because the food is there, because I am afraid that I will get hungry later, or simply from habit

- I assumed that when you get hungry it builds and builds until it becomes intolerable, and so you bury your face in a vat of ice cream. I found instead that hunger passes and once you have been really hungry you no longer fear it

- I thought that fasting would make me distractible, unable to concentrate. What I've discovered is that it sharpens my senses and my brain

- I wondered if I would feel faint for much of the time. It turns out that the body is incredibly adaptable and many athletes I've spoken to advocate training while fasting

- I feared it would be incredibly hard to do. It isn't

Why I got started

Although most of the great religions advocate fasting (the Sikhs are an exception, though they do allow fasting for medical reasons), I have always assumed that this was principally a way of testing yourself and your faith. I could see potential spiritual benefits but I was deeply sceptical about the physical benefits.

I have also had a number of body-conscious friends who, down the years, have tried to get me to fast, but I could never accept their explanation that the reason for doing so was 'to rest the liver' or 'to remove the toxins'. Neither explanation made any sense to a medically trained sceptic like me. I remember one friend telling me that after a couple of weeks of fasting his urine had turned black, proof that the toxins were leaving. I saw it as proof that he was an ignorant hippy and that whatever was going on inside his body as a result of fasting was extremely damaging. As I wrote in the introduction, what convinced me to try fasting was a combination of my own personal circumstances – in my mid-50s, high blood sugar, slightly overweight – and the emerging scientific evidence, which I list below.

That which does not kill us makes us stronger

There were a number of researchers who inspired me in

their different ways, but one who stands out is Professor Mark Mattson of the National Institute on Aging in Baltimore. A couple of years ago he wrote an article with Edward Calabrese in *New Scientist* magazine, 'When a little poison is good for you',[2] which really made me sit up and think.

'A little poison is good for you' is a colourful way of describing the theory of hormesis – the idea that when a human, or indeed any other creature, is exposed to a stress or toxin it can toughen them up. Hormesis is not just a variant of 'join the army and it will make a man of you'; it is now a well-accepted explanation in biology of how things operate at the cellular level.

Take, for example, something as simple as exercise. When you run or pump iron, what you are actually doing is damaging your muscles, causing small tears and rips. If you don't completely overdo it, then your body responds by doing repairs and in the process makes the muscles stronger.

Vegetables are another example. We all know that we should eat lots of fruit and vegetables because they are chock full of antioxidants – and antioxidants are great because they mop up the dangerous free radicals that roam our bodies doing harm.

The trouble with this widely accepted explanation of how fruit and vegetables 'work' is that it is almost certainly wrong, or at least incomplete. The levels of antioxidants in fruits and vegetables are far too low to

have the profound effects they clearly do. In addition, the attempts to extract antioxidants from plants and then give them to us in a concentrated form, as a health-inducing supplement, have been unconvincing when tested in long-term trials. Betacarotene, when you get it in the form of a carrot, is undoubtedly good for you. When they took betacarotene out of the carrot and gave it as a supplement to patients with cancer, it actually seemed to make them worse.

If we look through the prism of hormesis at the way vegetables work in our bodies, we can see that the reasons for their benefits may be quite different.

Consider this apparent paradox: bitterness is often associated in the wild with poisons, something to be avoided. Plants produce a huge range of so-called phytochemicals and some of them act as natural pesticides, to keep mammals like us from eating them. The fact that they taste bitter is a clear warning signal: keep away. So there are good evolutionary reasons why we should dislike and avoid bitter-tasting foods. Yet some of the vegetables that are particularly good for us, such as cabbage, cauliflower, broccoli and other members of the brassica family, are so bitter that even as adults many of us struggle to love them.

The resolution to this paradox is that these vegetables taste bitter because they contain chemicals that are potentially poisonous. The reason they don't harm us is that these chemicals are present in them at low doses that

are not toxic. Rather, they activate stress responses and switch on genes that protect and repair.

Once you start looking at the world in this way, you realise that many activities we initially find stressful – like eating bitter vegetables, going for a run, or Intermittent Fasting – are far from harmful. The challenge itself seems to be part of the benefit. The fact that prolonged starvation is clearly very bad for you does not imply that short periods of Intermittent Fasting must be a little bit bad for you. Indeed the reverse is true.

This point was vividly made to me by Professor Valter Longo, director of the University of Southern California's Longevity Institute. His research is mainly into the study of why we age, particularly concerning approaches that reduce the risk of developing age-related diseases such as cancer and diabetes.

I went to see Valter, not just because he is a world expert, but also because he had kindly agreed to act as my fasting mentor and buddy, to help inspire and guide me through my first experience of fasting.

Valter has been studying fasting for many years, and he is a keen adherent of it. He lives by his research and thrives on the sort of low-protein, high-vegetable diet that his grandparents enjoy in southern Italy. Perhaps not coincidentally, his grandparents live in a part of Italy that has an extraordinarily high concentration of long-lived people.

As well as following a fairly strict diet, Valter skips

lunch to keep his weight down. Beyond this, once every six months or so, he does a prolonged fast that lasts several days. Tall, slim, energetic, Italian, he is an inspiring poster boy for would-be fasters.

The main reason he is so enthusiastic about fasting is that his research, and that of others, has demonstrated the extraordinary range of measurable health benefits that you get from doing it. Going without food for even quite short periods of time switches on a number of 'repair genes', which, as he explained, can confer long-term benefits. 'There is a lot of initial evidence to suggest that temporary periodic fasting can induce long-lasting changes that can be beneficial against ageing and diseases,' he told me. 'You take a person, you fast them, after 24 hours everything is revolutionised. And even if you took a cocktail of drugs, very potent drugs, you will never even get close to what fasting does. The beauty of fasting is that it's all co-ordinated.'

Fasting and longevity

Most of the early long-term studies on the benefits of fasting were done in rodents. They also gave us important insights into the molecular mechanisms that underpin fasting.

In one early study from 1945, mice were fasted for either one day in four, one day in three or one day in two.

The researchers found that the fasted mice lived longer than a control group, and that the more they fasted the longer they lived. They also found that, unlike calorie-restricted mice, the fasted mice were not physically stunted.[3]

Since then numerous studies have confirmed, at least in rodents, the value of fasting. But why does fasting help? What is the mechanism?

Valter has access to his own supply of genetically engineered mice, known as dwarf or Laron mice, which he was keen to show me. These mice, though small, hold the record for longevity extension in a mammal. In other words, they live for an astonishingly long time.

The average mouse doesn't live that long, perhaps two years. Laron mice can live twice that, many for over four years when they are also calorie-restricted. In a human, that would be the equivalent of reaching almost 170.

The fascinating thing about Laron mice is not just their longevity, but the fact that they stay healthy for most of their very long lives. They simply don't seem to be prone to diabetes or cancer, and when they die, more often than not, it is of natural causes. Valter told me that on autopsy they are often unable to find a cause of death. They just seem to drop dead.

The reason these mice are so small and so long-lived is that they are genetically engineered so that their bodies do not respond to a hormone called IGF-1, Insulin-Like Growth Factor 1. IGF-1, as its name implies, has

growth-promoting effects on almost every cell in your body. It keeps your cells constantly active. You need adequate levels of IGF-1 and other growth factors when you are young and growing, but high levels later in life appear to lead to accelerated ageing and cancer. As Valter put it, it's like driving along with your foot flat down on the accelerator, pushing the car to continue to perform all the time. 'Imagine, instead of occasionally taking your car to the garage and changing parts and pieces, you simply kept on driving it and driving it and driving it. Well, the car, of course, is going to break down.'

Valter's work is focused on trying to figure out how you can go on driving as much as possible, and as fast as possible, while enjoying life. He thinks the answer is periodic fasting. Because one of the ways fasting works is by making your body reduce the amount of IGF-1 it produces.

The evidence that IGF-1 plays a key role in many of the diseases of ageing comes not just from rodents like the Laron mice but also from humans. For the last seven years, Valter has been studying villagers in Ecuador with a genetic defect, also called Laron syndrome. This is an extremely rare condition which affects fewer than 350 people in the world. People with Laron syndrome have bodies which don't seem to be able to respond to IGF-1. There's a specific mutation in the growth hormone receptor, causing a deficiency that is very

similar to that in the Laron mouse.

The villagers with Laron syndrome are normally quite short; many are less than four feet tall. The thing that is most surprising about them, however, is that, like the Laron mice, they simply don't seem to develop common diseases like diabetes and cancer. In fact, Valter says that, though they have been studied for many years, there is not a single case he has come across of someone with Laron dying of cancer. Yet their relatives, who live in the same household but who don't have Laron syndrome, get cancer like everybody else.

Disappointingly, for anyone hoping that IGF-1 will provide the secrets of immortality, people with Laron syndrome, unlike the mice, are not exceptionally long-lived. They certainly lead long lives, but not super-long lives. Valter thinks one reason for this may be that they tend to enjoy life rather than worry about their lifestyle. 'They smoke, eat a high-calorie diet, and then they look at me and they say, "Oh it doesn't matter, I'm immune."'

Valter thinks they prefer the idea of living as they want and dying at 85, rather than living more carefully and perhaps going beyond 100. He would like to persuade some of them to take on a healthy lifestyle and see what happens, but knows he wouldn't live long enough to see the outcome.

Fasting and repair genes

As well as reducing circulating levels of IGF-1, fasting also appears to switch on a number of repair genes. The reason this happens is not fully understood, but the evolutionary argument goes something like this. As long as we have plenty of food, our bodies are mainly interested in growing, having sex and reproducing. Nature has no long-term plans for us. She does not invest in our old age. Once we have reproduced we become disposable.

So what happens if you decide to fast? Well, the body's initial reaction is one of shock. Signals go to the brain reminding you that you are hungry, urging you to go out and find something to eat. But you resist. The body now decides that the reason you are not eating as much and as frequently as you usually do must be because you are now in a famine situation. In the past this would have been quite normal.

In a famine situation there is no point in expending energy on growth or sex. Instead the wisest thing the body can do is spend its precious store of energy on repair, trying to keep you in reasonable shape until the good times return once more. The result is that, as well as removing its foot from the accelerator, your body takes itself along to the cellular equivalent of a garage. There, all the little gene mechanics are ordered to start doing some of the urgent maintenance tasks that have been put off till now.

One of the things that calorie restriction does, for example, is to switch on a process called autophagy.[4] Autophagy, meaning 'self eat', is a process by which the body breaks down and recycles old and tired cells; just as with a car, it is important to get rid of damaged or ageing parts if you are going to keep things in good working order.

Valter thinks that the majority of people with a BMI over 25 would benefit from fasting, but he also thinks that if you plan to do it for more than a day it should be done in a proper centre. As he put it, 'a prolonged fast is an extreme intervention. If it's done well, it can be very powerful in your favour. If it's done improperly, it can be very powerful against you.' With a prolonged fast lasting several days, you also get a drop in blood pressure and some fairly profound metabolic re-programming. Some people faint. It's not common but it happens.

One of Valter's areas of research is into the effects of fasting on cancer (see more on pages 56-7 below) and this seems to be optimised by prolonged rather than Intermittent Fasting . As he pointed out, the first time you try fasting for a few days it can be a bit of a struggle. 'Our bodies are used to high levels of glucose and high levels of insulin, so it takes time to adapt. But then eventually it's not that hard.'

I wasn't keen to hear 'eventually', but by then I knew I would have to give it a go. It was a challenge, and one I thought I could win. Brain against stomach. No contest.

Experiencing a four-day fast

I don't think it is either necessary or particularly desirable to do a prolonged fast before embarking on the Fast Diet. While there are few known risks involved in fasting for less than 24 hours, the same is not true of prolonged fasts. I decided to start with a four-day fast because I knew I was in safe hands. I had also had my IGF-1 levels measured just before I met Valter and they were high. Not super-high, as he kindly put it, but at the top end of the range (my levels of IGF-1 or somatomedin-C, as it's also known, were 28.0nmol/l. The healthy range is 11.3–30.9nmol/l).

High levels of IGF-1 are associated with a range of cancers, among them prostate cancer which had troubled my father. Would a four-day fast change anything?

I had been warned that the first few days might be tough, but after that I would start feeling the effects of a rush of what Valter termed 'wellbeing chemicals'. Even better, the next time I fasted it would be easier because my body and brain would have a memory of it and understand what I was going through.

Having decided that I would try an extended fast, my next decision was how harsh to make it. A number of different countries have a tradition of fasting. The Russians seem to prefer it tough. For them, a fast consists of nothing but water, cold showers and exercise. The Germans, on the other hand, prefer their fasts to be

considerably gentler. Go to a fasting clinic in Germany and you will probably be fed around 200 calories a day in comfortable surroundings.

I wanted to see results, so I went for a British compromise. I would eat 25 calories a day, no cold showers and just try working as normal.

So on a warm Monday evening, I enjoyed my last meal, a filling dinner of steak, chips and salad washed down with beer. I felt a certain trepidation as I realised that for the next four days I would be drinking nothing but water, sugarless black tea and coffee, and one measly cup of low-calorie soup a day.

Despite what I'd been told and read, before I began my fast I secretly feared that hunger would grow and grow, gnawing away inside me until I finally gave in and ran amok in a cakeshop. The first 24 hours were quite tough, just as Valter had predicted, but as he had also predicted things got better, not worse. Yes, there were hunger pangs, sometimes quite distracting, but if I kept busy they went away.

During the first 24 hours of a fast, there are some quite profound changes going on inside the body. Within a few hours, glucose circulating in the blood is consumed. If that's not being replaced by food then the body turns to glycogen, a stable form of glucose that is stored in the muscles and liver.

Only when that's gone does it really switch on fat burning. What actually happens is that fatty acids are

broken down in the liver, resulting in the production of something called ketone bodies. The brain uses these ketone bodies as a source of energy, instead of glucose.

The first two days of a fast can be uncomfortable because your body and brain are having to cope with the switch from using glucose and glycogen as a fuel to using ketone bodies. The body is not used to them so you can get headaches, though I didn't. You may find it hard to sleep. I didn't. The biggest problem I had with fasting is hard to put into words; it was sometimes just feeling 'uncomfortable'. I can't really describe it more accurately than that. I didn't feel faint; I just felt out of place.

I did, occasionally, feel hungry, but most of the time I was surprisingly cheerful. By day three the feel-good hormones had come to my rescue.

By Friday, day four, I was almost disappointed that it was ending. Almost. Despite Valter's warning that it would be unwise to gorge immediately on breaking a fast, I got myself a plate of bacon and eggs and settled down to eat. After a few mouthfuls I was full. I really didn't need any more and in fact skipped lunch.

That afternoon I was tested again and discovered I had lost just under three pounds of body weight, a significant portion of which was fat. I was also happy to see that my blood glucose levels had fallen substantially and that my IGF-1 levels, which had been at the top end of the recommended range, had gone right down. In fact, they had almost halved. This was all good news.

I had lost some fat, my blood results were looking good, and I had learnt that I can control my hunger. Valter was extremely pleased with these changes, particularly the fall in IGF-1 that he said would significantly reduce my risk of cancer. But he also warned me that if I went back to my old lifestyle these changes would not be permanent.

Valter's research points towards the fact that high levels of protein, the amounts found in a typical western diet, help keep IGF-1 levels high. I knew that there is protein in foods like meat and fish, but I was surprised that there is so much in milk. I used to like drinking a skinny latte most mornings. I had the illusion that because it is made with skimmed milk it is healthy. Unfortunately, though low in fat, a large latte comes in at around 11g of protein. And Valter recommends that you don't eat more than 0.8g of protein per kg of body weight per day. For someone like me, that would be around 64g a day. The lattes would have to go.

Fasting and weight loss

One way to lose weight would be to go on a prolonged fast. I did the four-day fast, as described above, mainly because I was curious. I would not recommend it as a weight-loss regime because it is completely unsustainable. Unless they combine it with a vigorous exercise regime,

people who go on prolonged fasts lose muscle as well as fat. Then, when they stop, as they must eventually do, the risk is they will pile the weight right back on.

Fortunately less drastic, Intermittent Fasting – the subject of this book – leads to steady and sustainable weight loss and does not cause muscle loss.

Alternate Day Fasting

One of the most extensively studied forms of short-term fasting is Alternate Day Fasting (ADF). As its name implies, it means you get no food, or relatively little food, every other day. One of the few researchers to have done human studies in this area is Dr Krista Varady of the University of Illinois at Chicago.

Krista is slim, charming and very amusing. We met in an old-fashioned American diner where I guiltily ate burgers and fries while Krista told me about one of the recent studies she has been carrying out with human volunteers.[5] On fasting days the volunteers were allowed 25% of their normal energy needs, so men were allowed around 600 calories a day, women 500 calories a day. On fast days they ate all their calories in one go, at lunch. On their feed days they were asked to consume 125% of their normal energy needs.

Krista has done a number of studies on ADF, and what surprised her is that, even when they are allowed

to, people don't go crazy on their feed days. 'I thought when I started running these trials that people would eat 175% the next day; they'd just fully compensate and wouldn't lose any weight. But most people eat around 110%, just slightly over what they usually eat. I haven't measured it yet, but I think it involves stomach size, how far that can expand out. Because eating almost twice the amount of food that you normally eat is actually pretty difficult. You can do it over time; people that are obese, their stomachs get bigger to accommodate, you know, 5000 calories a day. But just to do it right off is actually pretty difficult.'

In her earlier studies, subjects were asked to stick to a low-fat diet, but what Krista wanted to know was whether ADF would also work if her subjects were allowed to eat a typical American high-fat diet. So she asked 33 obese volunteers, most of them women, to go on ADF for eight weeks. Before starting, the volunteers were divided into two groups. One group was put on a low-fat diet, eating low-fat cheeses and dairies, very lean meats and a lot of fruit and vegetables. The other group was allowed to eat high-fat lasagnes, pizza, the sort of diet a typical American might consume. Americans consume somewhere between 35 and 45% fat in their diet.

As Krista explained, the results were unexpected. The researchers and volunteers had assumed that the people on the low-fat diet would lose more weight than those on the high-fat diet. But, if anything, it was the other

way around. The volunteers on the high-fat diet lost an average of 5.6kg, while those on the low-fat diet lost 4.2kg. They both lost about seven centimetres around their waists.

Krista thinks that the main reason this happened was compliance. The volunteers randomised to the high-fat diet were more likely to stick to it than those on the low-fat diet simply because they found it a lot more palatable. And it wasn't just weight loss. Both groups saw impressive falls in low-density lipoprotein (LDL) cholesterol, the bad cholesterol, and in blood pressure. This meant that they had reduced their risk of cardiovascular disease, of having a heart attack or stroke.

Krista doesn't want to encourage people to binge on rubbish. She would much rather that people on ADF ate healthily, increased their fruit and vegetable intake, and generally ate less. The trouble is, as she pointed out rather exasperatedly, doctors have been encouraging people to embrace a healthy lifestyle for decades, and not enough of us are doing it. She thinks dieticians should take into account what people actually do rather than what we would like them to do.

One other significant benefit to Intermittent Fasting is that you don't seem to lose muscle, which you would on a normal calorie-restricted regime. Krista herself is not sure why that is and wants to do further research.

The two-day fast

One of the problems with ADF, which is why I am not so keen on it, is that you have to do it every other day. In my experience this can be socially inconvenient as well as emotionally demanding. There is no pattern to your week and other people, friends and family, find it hard to keep track of when your fast and feed days are. Unlike Krista's subjects, I was not particularly overweight to start with, so I also worried about losing too much weight too rapidly. That is why, having tried ADF for a short while, I decided to cut back to fasting two days a week.

I now have my own experience of this to fall back on (see page 60), together with the experiences of hundreds of others who have written to me over the last few months. But what trials have been done on two-day fasts in humans?

Well, Dr Michelle Harvie, a dietician based at the Genesis Breast Cancer Prevention Centre at the Wythenshawe Hospital in Manchester, has done a number of studies assessing the effects of a two-day fast on female volunteers. In a recent study, she divided 115 women into three groups. One group was asked to stick to a 1500-calorie Mediterranean diet, and was also encouraged to avoid high-fat foods and alcohol.[6] Another group was asked to eat normally five days a week, but to eat a 650-calorie, low-carbohydrate diet on the other two days. A final group was asked to avoid carbohydrates for two days

a week, but was otherwise not calorie-restricted.

After three months, the women on the two-day diets had lost an average of 4kg, which was almost twice as much as the full-time dieters, who had lost an average of just 2.4kg. Insulin resistance had also improved significantly in the two-day diet groups (see more on insulin on page 54).

The focus of Michelle's work is trying to reduce breast cancer risk through dietary interventions. Being obese and having high levels of insulin resistance are both risk factors. On the Genesis website (www.genesisuk.org), she points out that they have been studying Intermittent Fasting at the Genesis Breast Cancer Prevention Centre, University Hospital of South Manchester NHS Foundation Trust, for over six years and that their research has shown that cutting down on your calories for two days a week gives the same benefits, possibly more, than by going on a normal calorie-reduced diet. 'To date, our research has concluded that intermittent diets appear to be a safe, viable, alternative approach to weight loss and maintaining a lower weight, in comparison to daily dieting.'

Is it just calories?

If you eat 500 or 600 calories two days a week and don't significantly overcompensate during the rest of the week, then you will lose weight in a steady fashion.

But is there any evidence that Intermittent Fasting does more than that? I recently came across one particularly fascinating study suggesting that when you eat can be almost as important as what you eat.

In this study, scientists from the Salk Institute for Biological Studies took two groups of mice and fed them a high-fat diet.[7] The mice got exactly the same amount of food to eat, the only difference being that one group of mice was allowed to eat whenever they wanted, nibbling away when they were in the mood, rather like we do, while the other group of mice had to eat their food in an eight-hour time period. This meant that there were 16 hours of the day in which they were, involuntarily, fasting.

After 100 days, there were some truly dramatic differences between the two groups of mice. The mice who nibbled away at their fatty food had developed high cholesterol, high blood glucose and had liver damage. The mice that had been forced to fast for 16 hours a day put on far less weight (28% less) and suffered much less liver damage, despite having eaten exactly the same amount and quality of food. They also had lower levels of chronic inflammation, which suggests they had reduced risk of a number of diseases, including heart disease, cancer, stroke and Alzheimer's.

The Salk researchers' explanation for this is that all the time you are eating your insulin levels are elevated and your body is stuck in fat-storing mode (see the discussion

of insulin on page 54). Only after a few hours of fasting is your body able to turn off the 'fat storing' and turn on the 'fat burning' mechanisms. So if you are a mouse and you are continually nibbling, your body will just continue making and storing fat, resulting in obesity and liver damage.

By now, I hope you are as convinced as I am that fasting offers multiple health benefits, as well as helping to achieve weight loss. I had been aware of some of these claims before I got really interested in fasting and, though initially sceptical, I was converted by the sheer weight of evidence.

But there was one area of study that was a complete surprise: research showing how fasting can improve mood and protect the brain from dementia and cognitive decline. This, for me, was something completely new, unexpected, and hugely exciting.

Fasting and the brain

The brain, as Woody Allen once said, is my second favourite organ. I might even put it first, as without it nothing else would function. The human brain, around three pounds of pinkish greyish gunk with the consistency of tapioca, has been described as the most complex object in the known universe. It allows us to build, write poetry, dominate the planet and even understand ourselves,

something no other creature has succeeded in doing.

It is also an extremely efficient energy-saving machine, doing all that complicated thinking and making sure our bodies are functioning properly while using the same amount of energy as a 25-watt light bulb. The fact that our brains are normally so flexible and adaptable makes it even more tragic when they go wrong. I am aware that as I get older my memory has become more fallible. I've compensated by using a range of memory tricks I've picked up over the years, but even so I find myself occasionally struggling to remember names and dates. Far worse than this, however, is the fear that one day I may lose my mind entirely, perhaps developing some form of dementia. Obviously I want to preserve my brain in as good a shape as possible and for as long as possible. Fortunately fasting seems to offer significant protection.

The man I went to discuss my brain with was Professor Mark Mattson.

Mark Mattson, a professor of neuroscience at the National Institute on Aging, is one of the most revered scientists in his field: the study of the ageing brain. I find his work genuinely inspiring – suggesting, as it does, that fasting can help combat diseases like Alzheimer's, dementia and memory loss.

Although I could have taken a taxi to his office, I chose to walk. I'm a fan of walking. It not only burns calories, it also improves the mood, and it may also help retain your memory. Normally as we get older our brain

shrinks, but one study found that in regular walkers the hippocampus, an area of the brain essential for memory, actually expanded.[8] Regular walkers have brains that in MRI scans look, on average, two years younger than the brains of those who are sedentary.

Mark, who studies Alzheimer's, lost his own father to dementia. He told me that although it didn't directly motivate him to go into this particular line of research – when he started work on Alzheimer's disease his father had not yet been diagnosed – but it did give him insight.

Alzheimer's affects around 26 million people worldwide and the problem will grow as the population ages. New approaches are desperately needed because the tragedy of Alzheimer's disease and other forms of dementia is that once you're diagnosed it may be possible to delay, but not prevent, the inevitable deterioration. You are likely to get progressively worse to the point where you need constant care for many years. By the end you may not even recognise the faces of those you once loved.

Can fasting make you clever?

Just as Valter Longo had, Mark took me off to see some mice. Like Valter's mice, Mark's mice are genetically engineered, But they have been modified to make them more vulnerable to Alzheimer's. The mice I saw were in a maze, which they had to navigate in order to find

food. Some of the mice perform this task with relative ease; others get disorientated and confused. This task, and others like it, are designed to reveal signs that the mice are developing memory problems; a mouse that is struggling will quickly forget which arm of the maze it has already travelled down.

The genetically engineered Alzheimer's mice will, if put on a normal diet, quickly develop dementia. By the time they are a year old, the equivalent of middle age in humans, they normally have obvious learning and memory problems. The animals put on an intermittent fast, something Mark prefers to call 'intermittent energy restriction', often go up to 20 months without any detectable signs of dementia.[9] They only really start deteriorating towards the end of their lives. In humans that would be the equivalent of developing signs of Alzheimer's at the age of 80 rather than at 50. I know which I would prefer.

Disturbingly, when these mice are put on a typical junk-food diet, they go downhill much earlier than even normally fed mice. 'We put mice on a high-fat and high-fructose diet,' Mark said, 'and that has a dramatic effect; the animals have an earlier onset of the learning and memory problems, more accumulation of amyloid and more problems with finding their way in a maze test.'

In other words, junk food makes these mice fat and stupid.

One of the key changes that occur in the brains of

Mark's fasting mice is increased production of a protein called brain-derived neurotrophic factor. BDNF has been shown to stimulate stem cells to turn into new nerve cells in the hippocampus. As I mentioned earlier, this is a part of the brain that is essential for normal learning and memory.

But why should the hippocampus grow in response to fasting? Mark points out that from an evolutionary perspective it makes sense. After all, the times when you need to be smart and on the ball are when there's not a lot of food lying around. 'If an animal is in an area where there's limited food resources, it's important that they are able to remember where food is, remember where hazards are, predators and so on. We think that people in the past who were able to respond to hunger with increased cognitive ability had a survival advantage.'

We don't know for sure if humans grow new brain cells in response to fasting; to be absolutely certain researchers would need to put volunteers on an intermittent fast and then kill them, take their brains out and look for signs of new neural growth. It seems unlikely that many would volunteer for such a project. But what they are doing is a study where volunteers fast and then MRI scans are used to see if the size of their hippocampi changes over time.

As I mentioned above, these techniques have been used in humans to show that regular exercise, such as walking, increases the size of the hippocampus. Hopefully similar

studies will show that two days a week of Intermittent Fasting is good for learning and memory. On a purely anecdotal level, and using a sample size of one, it seems to work. Before starting the Fast Diet, I did a sophisticated memory test online. Two months in I repeated the test and my performance had, indeed, improved. If you are interested in doing something similar then I suggest you go to www.cognitivefun.net/test/2. Do let us know how you get on.

Fasting and mood

One of the things that Professor Valter Longo and others told me before I began my four-day fast was that it would be tough initially, but that after a while I would start to feel more cheerful, which was indeed what happened. Similarly, I was surprised to discover how positive I have felt while doing Intermittent Fasting. I expected to feel tired and crabby on my fasting days, but not at all. So is this simply a psychological effect, that people who do Intermittent Fasting and lose weight feel good about themselves, or are there also chemical changes that are influencing mood?

According to Professor Mark Mattson, one of the reasons people may find Intermittent Fasting relatively easy to do due to its effects on BDNF. BDNF not only seems to protect the brain against the ravages of dementia

and age-related mental decline, but it may also improve your mood.

There have been a number of studies going back many years that suggest rising levels of BDNF have an antidepressant effect, at least in rodents. In one study, they injected BDNF directly into the brains of rats and found this had similar effects to repeated use of a standard antidepressant.[10] Another paper found that electric shock therapy, which is known to be effective in severe depression, seems to work, at least in part, because it stimulates the production of higher levels of BDNF.[11]

Mark Mattson believes that within a few weeks of starting a two-day-a-week fasting regime, BDNF levels will start to rise, suppressing anxiety and elevating mood. He doesn't currently have the human data to fully support this claim, but he is doing trials on volunteers which involve, among other things, collecting regular samples of cerebrospinal fluid (the liquid that bathes the brain) in order to measure the changes that occur during intermittent fasts. This is not a trial for the faint-hearted as it requires regular spinal taps, but as Mark pointed out to me, many of his volunteers are already undergoing early signs of cognitive change, so they are extremely motivated.

Mark is keen to study and promote the benefits of Intermittent Fasting as he is genuinely worried about the likely effects of the current obesity epidemic on our brains

and our society. He also thinks if that if you are considering Intermittent Fasting you should get going sooner rather than later: 'The age-related cognitive decline in Alzheimer's disease, the events that are occurring in the brain at the level of the nerve cells and the molecules in the nerve cells, those changes are occurring very early, probably decades before the subject starts to have learning and memory problems. That's why it's critical to start dietary regimes early on, when people are young or middle-aged, so that they can slow down the development of these processes in the brain and live to be 90 with their brain functioning perfectly well.'

Like Mark, I'm convinced the human brain benefits from short periods abstaining from food. This is an exciting and fast-emerging area of research that many will watch with great interest. Beyond the brain, though, Intermittent Fasting also has measurable, beneficial effects on other areas of the body – on your heart, on your blood profile, on your risk of cancer. And that's where we'll turn now.

Fasting and the heart

One of the main reasons I decided to try fasting was that tests had suggested I was heading for serious problems with my cardiovascular system. Nothing has happened yet, but the warning signs were flashing amber. The

tests showed that my blood levels of LDL (low-density lipoprotein, the 'bad' cholesterol) were disturbingly high, as were the levels of my fasting glucose.

To measure 'fasting glucose' you have to fast overnight, then give a sample of blood. The normal, desirable range is 3.9-5.8mmol/l. Mine was 7.3mmol/l. Not yet diabetic, but dangerously high. There are many reasons why you should do all you can to avoid becoming a diabetic, not least the fact that it dramatically increases your risk of having a heart attack or stroke.

Fasting glucose is an important thing to measure because it is an indicator that all may not be well with your insulin levels.

Insulin – the fat-making hormone

When we eat food, particularly food rich in carbohydrates, our blood glucose levels rise and the pancreas, an organ below the ribs and near the left kidney, starts to churn out insulin. Glucose is the main fuel that our cells use for energy, but the body does not like having high levels of it circulating in the blood. The job of insulin, a hormone, is to regulate blood glucose levels, ensuring that they are neither too high nor too low. It normally does this with great precision. The problem comes when the pancreas gets overloaded.

Insulin is a sugar controller; it aids the extraction of

glucose from blood and then stores it in places like your liver or muscles in a stable form called glycogen, to be used when and if it is needed. What is less commonly known is that insulin is also a fat controller. It inhibits something called lipolysis, the release of stored body fat. At the same time, it forces fat cells to take up and store fat from your blood. Insulin makes you fat. High levels lead to increased fat storage, low levels to fat depletion.

The trouble with constantly eating lots of sugary, carbohydrate-rich foods and drinks, as we increasingly do, is that this requires the release of more and more insulin to deal with the glucose surge. Up to a point, your pancreas will cope by simply pumping out ever-larger quantities of insulin. This leads to greater fat deposition and also increases the risk of cancer. Naturally enough, this can't go on forever. If you continue to produce ever-larger quantities of insulin, your cells will eventually rebel and become resistant to its effects. It's rather like shouting at your children; you can keep escalating things, but after a certain point they will simply stop listening.

Eventually the cells stop responding to insulin; your blood glucose levels now stay permanently high and you will find you have joined the 285 million people around the world who have type 2 diabetes. It is a massive and rapidly growing problem worldwide. Over the last 20 years, numbers have risen almost tenfold and there is no obvious sign that this trend is slowing.

Diabetes is associated with an increased risk of heart attack, stroke, impotence, going blind and losing your extremities due to poor circulation. It is also associated with brain shrinkage and dementia. Not a pretty picture.

One way to prevent the downward spiral into diabetes is to cut back on the carbohydrates and instead start eating more vegetables and fat, since these foods do not lead to such big spikes in blood glucose. Nor do they have such a dramatic effect on insulin levels. The other way is to try Intermittent Fasting.

How Intermittent Fasting affects insulin sensitivity

In a study from 2005, eight healthy young men were asked to fast every other day, 20 hours a day, for two weeks.[12] On their fasting days they were allowed to eat until 10pm, then not eat again until 6pm the following evening. They were also asked to eat heartily the rest of the time to make sure they did not lose any weight.

The idea behind the experiment was to test the so-called 'thrifty hypothesis', the idea that since we evolved at a time of feast and famine the best way to eat is to mimic those times. At the end of the two weeks, there were no changes in the volunteers' weight or body-fat composition, which is what the researchers had intended. There was, however, a big change in their insulin sensitivity. In other words,

after just two weeks of Intermittent Fasting, the same amount of circulating insulin now had a much greater effect on the volunteers' ability to store glucose or break down fat.

The researchers wrote jubilantly that, 'by subjecting healthy men to cycles of feast and famine we changed their metabolic status for the better'. They also added that, 'to our knowledge this is the first study in humans in which an increased insulin action on whole body glucose uptake and adipose tissue lipolysis has been obtained by means of Intermittent Fasting.'

I don't know what impact Intermittent Fasting has had on my insulin sensitivity – it's a test that is hard to do and extremely expensive – but what I do know is that the effects on my blood sugar have been spectacular. Before I started fasting, my blood glucose level was 7.3 mmol/l, well above the acceptable range of 3.9 – 5.8 mmol/l. The last time I had my level measured it was 5.0 mmol/l, still a bit high but well within the normal range.

This is an incredibly impressive response. My doctor, who was preparing to put me on medication, was astonished at such a dramatic turnaround. Doctors routinely recommend a healthy diet to patients with high blood glucose, but it usually only makes a marginal difference. Intermittent Fasting could have a revolutionary, game-changing effect on the nation's health.

Fasting and cancer

My father was a lovely man but not a particularly healthy one. Overweight for much of his life, by the time he reached his 60s he had developed not only diabetes but also prostate cancer. He had an operation to remove the cancer that left him with embarrassing urinary problems. Understandably, I am not at all keen to go down that road.

My four-day fast, under Professor Valter Longo's supervision, had shown me that it was possible to dramatically cut my IGF-1 (Insulin-like Growth Factor 1) levels and by doing so, hopefully, my prostate cancer risk. I later discovered that Intermittent Fasting had a similar effect on my IGF-1 levels. The link between growth, fasting and cancer is worth unpacking.

The cells in our bodies are constantly multiplying, replacing dead, worn-out or damaged tissue. This is fine as long as cellular growth is under control, but sometimes a cell mutates, grows uncontrollably and turns into a cancer. Very high levels in the blood of a cellular stimulant, like IGF-1, are likely to increase the chance of this happening.

When a cancer goes rogue, the normal options are surgery, chemotherapy or radiotherapy. Surgery is used to try to remove the tumour; chemotherapy and radiotherapy are there to try and poison it. The major problem with

chemotherapy and radiotherapy is that they are not selective; as well as killing tumour cells they will kill or damage surrounding healthy cells. They are particularly likely to damage rapidly dividing cells such as hair roots, which is why hair commonly falls out following therapy.

As I mentioned above, Valter Longo has shown that when we are deprived of food for even quite short periods of time, our body responds by slowing things down, going into repair and survival mode until food is once more abundant. That is true of normal cells. But cancer cells follow their own rules. They are, almost by definition, not under control and will go on selfishly proliferating whatever the circumstances. This 'selfishness' creates an opportunity. If you fast just before chemotherapy, at least in theory, you create a situation where your normal cells are hibernating while the cancer cells are running amok and therefore more vulnerable.

In a paper published in 2008, Valter and colleagues showed that fasting 'protects normal but not cancer cells against high-dose chemotherapy'.[13] They followed this with another paper in which they showed that fasting increased the efficacy of chemotherapy drugs against a variety of cancers.[14]

Again, as is so often the case, this was a study done with mice. But the implications of Valter's work were not missed by an eagle-eyed judge called Nora Quinn, who saw a short article about it in *The LA Times*.

Nora's story

I met Nora in Los Angeles. She is a feisty woman with a terrific, dry sense of humour. Nora first noticed she had a problem when, one morning, she put her hand on her breast and felt a lump the size of a walnut under her skin. After indulging, as she put it, in the fantasy that it was a cyst, it was removed and sent to a pathologist.

'The reality of your life always comes out in pathology,' she told me. When the pathology report came back it said that she had invasive breast cancer. She had a course of radiotherapy and was about to start chemotherapy when she read about Professor Longo's work with mice.

She tried to speak to Valter, but he wouldn't advise her because none of the trials he had run, up to that point, had been done with humans. He didn't know if it was safe for someone about to undergo chemo to fast and he certainly wasn't going to encourage people like Nora to give it a go.

Undeterred, Nora did her own research and decided to try fasting for a seven-and-a-half-day, water-only fast; it would cover before, during and after chemotherapy. Having discovered how tough it can be to do even a four-day fast while fully healthy, I'm surprised she was able to go through with it, though Nora says it's not so hard and I'm just a wimp. The results were mixed: 'After the first chemo I didn't get that sick, but my hair fell out.'

So next time she didn't fast, and she was only medium

sick. 'I thought it wasn't working. I thought, seven and a half days of fasting to avoid being medium sick, this is a really bad deal. I am so not doing that again.'

When it was time for her third course of chemo, she didn't fast. That, she now feels, was a mistake.

'I got sick. I don't have words for how sick I was. I was weak, felt poisoned, and I couldn't get up. I felt like I was moving through jello. It was absolutely horrible.'

The cells that line the gut, like hair root cells, grow rapidly because they need to be constantly replaced. That's one reason why chemotherapy can make people feel really ill.

By the time Nora had to undergo her fourth course of chemo she had decided once again to try fasting. This time things went much better and she made a good recovery. She is currently cancer free.

Nora is convinced she benefitted from fasting but it's hard to be sure because she wasn't part of a proper medical trial. Valter and colleagues at University of Southern California did, however, study what happened to her and 10 other patients with cancers who had also decided to put themselves on a fast.[15] All of them reported fewer and less severe symptoms after chemotherapy and most of them, including Nora, saw improvements in their blood results. The white cells and platelets, for example, recovered more rapidly when they had chemo in a fasted state than when they did not. But why did Nora go rogue? Why didn't she fast under proper supervision?

'I decided to fast based on years of information from animal testing. I do agree that if you are going to do crazy things like I do you should have medical supervision. But how? None of my doctors would listen to me.'

Nora's self-experiment could have gone wrong, which is just one reason why such maverick behaviour is not recommended. Her experience, however, and that of the other nine cancer patients, helped inspire further studies.

For example, Professor Valter Longo and his colleagues have recently completed Phase I of a clinical trial to see if fasting around the time of chemotherapy is safe, which it seems to be. The next thing is to assess whether it makes a measurable difference. At least ten other hospitals around the world are either doing or have agreed to do clinical trials. Go to our website for the latest updates.

Intermittent Fasting: my personal journey

As you've read, I started out by trying the four-day fast under Professor Valter Longo's supervision. But despite the improvements in my blood biochemistry and his obvious enthusiasm, I could not imagine doing lengthy fasts on a regular basis for the rest of my life. So what next? Well, having met Dr Krista Varady and learnt all about ADF (Alternate Day Fasting) I decided to give that a go.

After a short while, however, I realised that it was

just too tough, physically, socially and psychologically. I need some pattern in my life and not being able to tell without a calendar and lengthy calculations whether I could meet friends for dinner on a particular night was irksome. I also found fasting every other day just a little too challenging. I realise that many of Krista's volunteers do manage to stick to it, but they are in a trial situation and highly motivated. It is undoubtedly an effective way to lose weight rapidly and to get powerful changes to your biochemistry, but it was not for me. So I decided to try eating 600 calories for two days a week. It seemed a reasonable compromise and, more importantly, doable.

I tried eating all my food in one meal, but I discovered that if I skipped breakfast I started to feel hungry and irritable well before lunch. So I split my food in two: a moderate breakfast, miss lunch, a light supper. And I did it twice a week. This I found extremely manageable.

After experimenting with different versions of fasting, I found the 5:2 approach is the most effective and workable way for me to get the benefits of fasting and still retain a long-term commitment to a dietary plan. The 5:2 Fast Diet is based on a number of different forms of Intermittent Fasting; it is not based on any one body of research, but is a synthesis.

Before embarking on the diet, I decided to get myself properly tested, to see what effects it would have on my body. The following are the tests I did. Most are straight-

forward. The blood tests are, with one exception, tests your doctor should be happy to do for you.

Get on the scales

The first and most obvious thing you will want to do is weigh yourself before embarking on this adventure. Initially, it is best to do this at the same time every day. First thing in the morning is, as I'm sure you know, when you will be at your lightest.

Ideally you should get a weighing machine that measures body-fat percentage as well as weight, since what you really want to see is body-fat levels fall. The cheaper machines are not fantastically reliable; they tend to underestimate the true figure, giving you a false sense of security. What they are quite good at doing, however, is measuring change. In other words, they might tell you when you start that you are 30% body fat when the true figure is closer to 33%. But they should be able to tell you when that number begins to fall.

Body fat

Body fat is measured as a percentage of total weight. The machines you can buy do this by a system called impedence. There's a small electric current that runs through your body and the machine measures the resistance. It does its estimation based on the fact that muscle and other tissues are better conductors of electricity than fat.

The only way to get a truly accurate figure is with a machine called a DXA (formerly DEXA) scan. It stands for 'Dual Energy X-ray Absorptiometry'. It is expensive and for most people unnecessary. Your BMI will tell you if you are overweight. Women tend to have more body fat than men. A man with body fat of more than 25% would be considered overweight. For a woman it would be 30%.

Calculate your BMI

To calculate your BMI, go to a website such as www.nhs.uk/tools/pages/healthyweightcalculator.aspx. This will not only do the calculation, but also tell you what it means. One criticism of BMI is that someone who has a lot of muscle could get a high BMI score. This is not an issue for most of us. Sadly.

Measure your stomach

BMI is useful but it may not be the best predictor of future health. In a study of over 45,000 women followed for 16 years, the waist-to-height ratio was a superior predictor of who would develop heart disease. The reason why the waist matters so much is that visceral fat, which collects inside the abdomen, is the worst sort of fat, because it causes inflammation and puts you at much higher risk of diabetes. You don't need fancy equipment to tell you if you have internal fat. All you need is a tape measure.

Male or female, your waist should be less than half

your height. Most people underestimate their waist size by about two inches because they rely on trouser size. Instead, measure your waist by putting the tape measure around your belly button. Be honest. A definition of optimism is someone who steps on the scale, while holding their breath. You are fooling no one.

Blood tests

You should be able to get standard tests on the NHS.

> Fasting glucose. I chose to measure my fasting glucose because it is a really important measure of fitness, even if you are not at risk of diabetes, and a predictor of future health. Studies show that even moderately elevated levels of blood glucose are associated with increased risk of heart disease, stroke and long-term cognitive problems. Ideally I would have had my insulin sensitivity measured, but that test is complex and expensive.
>
> Cholesterol. They measure two types of cholesterol: LDL (low-density lipoprotein) and HDL (high-density lipoprotein). Broadly speaking, LDL carries cholesterol into the wall of your arteries while HDL

carries it away. It is good to have a low-ish LDL and a highish HDL. One way you can express this is as a percentage: HDL to HDL + LDL. Anything over 20% is good.

Triglycerides. These are a type of fat that is found in blood; they are one of the ways that the body stores calories. High levels are associated with increased risk of heart disease.

IGF-1. This is an expensive test and not available on the NHS. It is a measure of cell turnover and therefore of cancer risk. It may also be a marker for biological ageing. I wanted to find out the effects of 5:2 fasting on my IGF-1. I had discovered that IGF-1 levels drop dramatically in response to a four-day fast, but after a month of normal eating they bounced right back to where they had been before.

My data

These are the results of the physical measurements I took before starting the Fast Diet:

	ME	RECOMMENDED
HEIGHT	5' 11"	
WEIGHT	187lb	
BODY MASS INDEX	26.4	19-25
BODY FAT	28%	Less than 25% for men
WAIST SIZE	36 "	Less than half your height
NECK SIZE	17 "	Less than 16.5"

I wasn't obese, but both my BMI and my body-fat percentage told me that I was overweight. I knew from doing an MRI scan that much of my fat was collected internally, wrapping itself in thick layers around my liver and kidneys, disturbing all sorts of metabolic pathways.

Clearly, the fat wasn't all inside my abdomen. Quite a bit had collected around my neck. This meant that I was snoring. Loudly. Neck size is a powerful predictor of whether you will snore or not.[16] A neck size above 16.5" for men or 16 inches for women means you are in the danger zone.

	MY RESULTS in mmol/l	RECOMMENDED
DIABETES RISK: FASTING GLUCOSE	7.3	3.9–5.8
HEART DISEASE FACTORS:		
TRIGLYCERIDES	1.4	Less than 2.3
HDL CHOLESTEROL	1.8	0.9–1.5
LDL CHOLESTEROL	5.5	Up to 3.0

HEART DISEASE RISK HDL % of total	23%	20% and over
CANCER RISK Somatomedin-C (IGF-1)	28.6 nmol/l	11.3–30.9nmol/l

According to this data, my fasting glucose was worryingly high. I was not yet a diabetic but I had signs of what is called impaired glucose tolerance, pre-diabetes. My LDL was far too high, but I was to some extent protected by the fact that my triglycerides were low and my HDL high. This is not a good picture, though.

My IGF-1 levels were also too high, suggesting rapid turnover of cells and increased cancer risk.

After three months on the Fast Diet there were some remarkable changes.

	ME	RECOMMENDED
HEIGHT	5' 11"	
WEIGHT	168lb	
BODY MASS INDEX	24	19-25
BODY FAT	21%	Less than 25% for men
WAIST SIZE	33 inches	Less than half your height
NECK SIZE	16 inches	Less than 16.5 inches

I had lost about 19lb, almost one and a half stone. My BMI and body-fat percentage were now respectable. I

had to go out and buy smaller belts and tighter trousers. I could fit into a dinner jacket I hadn't worn for ten years. I had also stopped snoring, which delighted my wife and quite possibly the neighbours. Even better, my blood indicators had improved in a spectacular fashion.

	MY RESULTS in mmol/l	RECOMMENDED
DIABETES RISK: FASTING GLUCOSE	5.0	3.9–5.8
HEART DISEASE FACTORS:		
TRIGLYCERIDES	0.6	Less than 2.3
HDL CHOLESTEROL	2.1	0.9–1.5
LDL CHOLESTEROL	3.6	Up to 3.0
HEART DISEASE RISK HDL % of total	37%	20% and over
CANCER RISK Somatomedin-C (IGF-1)	15.9nmol/l	11.3–30.9nmol/l

My wife Clare, who is a doctor, was astonished. She regularly sees overweight patients with blood chemistry like mine had been and she said that none of the advice she gives has anything like the same effect.

For me, the particularly pleasing changes were in my fasting glucose levels and the huge drop in my IGF-1 levels, which matched the changes I had seen after doing a four-day fast.

Clare, however, felt I was losing weight too fast, that I should consolidate for a while. That is why I decided to go on a maintenance dose of fasting just one day a week. Unless it's the weekend, holidays or a special occasion, I also, regularly, skip lunch.

What has happened is that my weight has stayed steady at 12 stone and my bloods remain in good shape. I do, however, think there is room for improvement and will shortly restart a two-day regime and blog about it. If you are interested then do visit our website, www.thefastdiet.co.uk.

So, what is the best way to go about an Intermittent Fast?

Let's recap on what we've learnt. The reason for Intermittent Fasting – briefly but severely restricting the amount of calories you consume – is that by doing so you are hoping to 'fool' your body into thinking it is in a potential famine situation and that it needs to switch from go-go mode to maintenance mode.

The reason our bodies respond to fasting in this way is that we evolved at a time when feast and famine were the norm. Our bodies are designed to respond to stresses and shocks; it makes them healthier, tougher. The scientific term is hormesis – that which does not kill you makes you stronger. The benefits of fasting include:

- Weight loss

- A reduction of IGF-1, which means that you are reducing your risk of a number of age-related diseases, such as cancer

- The switching-on of countless repair genes in response to this stressor

- Giving your pancreas a rest, which will boost the effectiveness of the insulin it produces in response to elevated blood glucose. Increased insulin sensitivity will reduce your risk of obesity, diabetes, heart disease and cognitive decline

- An overall enhancement in your mood and sense of wellbeing. This may be a consequence of your brain producing increased levels of neurotrophic factor, which will hopefully make you more cheerful, which in turn should make fasting more doable

So much for the science. In the next chapter Mimi discusses what to eat and how to go about starting life as an Intermittent Faster. How do you put the theory into practice?

THE FAST DIET IN PRACTICE

There are, as we've seen, good clinical reasons to start Intermittent Fasting. Some, such as its positive effect on blood markers, should be immediately apparent; others will become manifest over time – a cognitive boost, a self-repairing physiology, a greater chance of a longer life. But perhaps the most compelling argument for many is the promise of swift and sustained weight loss, while still eating the foods you enjoy, most of the time. You may view this as incidental to the plan's other marked health benefits. Or it may be your primary objective. The fact is you will gain both. Weight loss and better health, two sides of the same page.

Michael's experience, as described in the previous chapter, will have given you an idea of what to expect. In this chapter I will reveal more detail – explaining how to start, how it will feel, how to keep going and how the central tenets of the Fast Diet can slip easily into the rhythm of your everyday life.

Now, it's over to you.

What do 500-600 calories look like?

Cutting calories to a quarter of your usual daily intake is a significant commitment, so don't be surprised if your first fast day feels like a tough gig. As you progress, the fasts will become second nature and the initial sense of deprivation will diminish, particularly if you remain aware that tomorrow is another day – another day, in fact, when you can eat as you please.

Still, however you cut it, 500 or 600 calories is no picnic; it's not even half a picnic. A large café latte can clock in at over 300 calories, more if you insist on cream, while your usual lunchtime sandwich might easily consume your entire allowance in one huge bite. So be smart. Spend your calories wisely – the Menu Plans on pages 139-161 will be useful – but it's also worth having a clear idea of favourite fast-day foods that work for you. Remember to embrace variety: differing textures, punchy flavours, colour and crunch. Together, these things will keep your mouth entertained and stop it frowning at the hardship of it all.

When to fast

Animal studies, human studies, research, experiment: as demonstrated in the previous chapter, evidence for the value of fasting is strong. But what happens when you step

out of the laboratory and into real life? When and what you eat during your 'fast' is critical to the diet's success. So what's the optimal pattern?

Michael tried several different fasting regimes; the one he settled on as the most sustainable for him is a fast on two non-consecutive days each week, allowing 600 calories a day, split between breakfast and dinner. This pattern has been called, for obvious reasons, a 5:2 diet – five days off, two days on, which means that the majority of your time is spent gloriously free from calorie-counting. On a fast day, he'll normally have breakfast with the family at around 7.30am and then aim to have dinner with them at 7.30pm, with nothing eaten in between. That way, he gets two 12-hour fasts in a day, and a happy family at the end of it.

The menu suggestions on pages 139-161 are based on this pattern as it is, in his experience, the most straightforward Intermittent Fasting method.

As will become clear later in this chapter, I found that a slightly different pattern works for me. Sticking to the Fast Diet's central tenet, I eat 500 calories – but as two meals with a few snacks (an apple, some carrot sticks) in between, simply because the vast plain between breakfast and supper feels too great, too empty for comfort. There is evidence, from trials conducted by Dr Michelle Harvie[17] and others, that this approach will help you lose weight, reduce your risk of breast cancer and increase insulin sensitivity.

Which approach is better? At this point, given that the science of Intermittent Fasting is still in its infancy, we don't know. On purely theoretical grounds, a longer period without food (Michael's pattern) might be expected to produce better results than one where you eat smaller amounts more frequently. But as far as we are aware there have, as yet, been no studies which attempt to compare the health benefits to people on a fasting day of either eating their calories in one go, split up or spread throughout the day. When we know more we will update you.

Professor Mark Mattson at the National Institute on Aging says that by eating your calories as a single meal you might get a modestly greater ketogenic ('fat-burning') effect, compared to three very small meals spread through the day. But he also thinks we shouldn't get too hung up about it. 'Regardless of whether the 600 calories is consumed as one meal or two or three smaller meals, you will get major health benefits.'

We await more trials but it is already clear from the hundreds who have tried it that as long as you stick to the Fast Diet you will enjoy that crucial combination of weight loss, health benefits and cheerful compliance.

Some people who don't feel hungry at breakfast would rather eat later in the day. That's fine. One of the key researchers in this field often starts her day with a late breakfast at around 11am and finishes with supper at 7pm. That way, she's fasting for 16 hours a day, twice a

week. Based on the mouse study cited on page 28, it may even be a better approach.

It is, however, only better if you actually do it, and a delayed breakfast may not suit some lifestyles, timetables or bodies. So go with a timetable that suits you. Some fasters will appreciate the convenience and simplicity of a single 500- or 600-calorie meal, allowing them to ignore food entirely for most of the day. Whatever you choose, it must be your plan, your life. Do it with gusto, but be prepared to experiment, within the limits set out by the plan.

What to eat

It may seem curious to talk about what to eat when you are fasting. But the Fast Diet is a modified programme, allowing 500 calories for a woman and 600 for a man on any given fast day, making the regime relatively comfortable and, above all, sustainable over the longterm. So, yes, you do get to eat on a fast day. But it matters what you choose.

There are two general principles that should govern what you eat and what you avoid on a fast day. Your aim is to have food that makes you feel satisfied, but stays firmly within the 500/600 calorie allowance – and the best options to achieve this are foods that are high in protein, and foods with a low glycaemic index (GI).

There have been a number of studies demonstrating that individuals who eat a diet higher in protein feel fuller for longer (indeed the main reason why people lose weight on diets like Atkins is because they eat less).[18] The trouble with really high-protein diets, however, is that people tend to get bored of the food restrictions and give up.

There is also evidence that high-protein diets are associated with higher levels of chronic inflammation and IGF-1, which in turn are associated with increased risk of heart disease and cancer.[19]

So the Fast Diet does not recommend boycotting carbs entirely, or living permanently on a high-protein diet. However, on a fast day, the combination of proteins and foods with a low GI will be helpful weapons in keeping hunger at bay.

Understanding the glycaemic index

In earlier chapters, we discovered the importance of blood sugar and insulin. High levels of insulin brought about by high levels of blood sugar will encourage your body to store fat and increase your cancer risk. Another reason not to eat foods that make your blood sugar levels surge, particularly on your fast days, is that when your blood sugar crashes, as it inevitably will, you will start feeling very hungry indeed.

Carbohydrates have the biggest impact on blood

sugars, but not all carbs are equal. As habitual dieters will know, one way to discover which carbs cause a big spike and which don't is to look at their GI. Each food gets a score out of 100, with a low score meaning that the particular food does not tend to cause a rapid rise in blood glucose. These are the ones you want.

The size of the sugar spike depends both on the food itself, and on how much of it you eat. For example, we tend to eat a lot more potatoes in one sitting than kiwi fruit. So there's also a measure called GL, the Glycaemic Load, which:

$$\frac{\text{GI x grams of carbohydrate}}{100}$$

This makes some pretty heroic assumptions about the amount of a particular food you are likely to eat as a portion, but at least it is a guide.

The reason GI and GL are interesting is not just because they are strongly predictive of future health (people on a low GL diet have less risk of diabetes, heart disease and various cancers), but because there are so many surprises. Who would have imagined that eating a baked potato would have as big an impact on your blood glucose as eating a tablespoon of sugar?

Broadly speaking a GI over 50 or a GL over 20 is not good, and the lower both figures are the better. It is worth restating that GI and GL are measures that relate to carbs.

GI is not relevant to protein and fats, which is why none of the foods listed have a significant protein or fat content. As an example, let's take a quick look at breakfast:

BREAKFAST	GI	GL
PORRIDGE	50	10
MUESLI	50	10
BAGUETTE	95	15
CROISSANT	67	17
CORNFLAKES	80	20

Source: http://people.bu.edu/sobieraj/papers/GlycemicIndices.pdf

You can see why, if you are having a carb breakfast, porridge and muesli are better options than cornflakes or a croissant. And what are you going to put on your muesli?

	GI	GL
MILK	27	3
SOY MILK	44	8

The relatively high GI and GL of soy milk is just one reason to stick with dairy. And since we're handing out surprises, here's another one:

	GI	GL
ICE CREAM	37	4

You would bet your house on ice cream being high GI/GL, but not so. If you factor it into your calorie count, low-calorie ice cream with strawberries is a treat to round off a meal. For more on the GI and GL of various foods and how best to plan your fast-day foods, see pages 107-8.

What about protein?

We certainly don't recommend eating protein to the exclusion of all else on a fast day, but you do require an adequate quantity, for muscle health, cell maintenance, endocrinal regulation, immunity and energy. Protein is satiating too, so it's well worth including it in your calorie quota. While Valter Longo recommends 0.8g of protein per kg of body weight per day – which would give a 12 stone man around 60g, and a nine-stone woman around 45g – perhaps the simplest method is to stick to recommended governmental guidelines, which allow for a (quite generous) 50g per day.

Go for 'good protein'. Steamed white fish, for example, is low in saturated fats and rich in minerals. Choose skinless chicken over red meat; try low-fat dairy products over endless lattes; include prawns, tuna, tofu and other plant proteins. Nuts, seeds, pulses and legumes are full of fibre and act as bulking agents on a hungry day. Nuts – though high in calories (depending, of course, on how many you eat) – are generally low GI and brilliantly satiating. They

are fatty too, so you might imagine they are 'bad for you', yet the evidence is that nut consumers have lower rates of heart disease and diabetes than nut abstainers.[20]

Eggs, meanwhile, are low in saturated fat and full of nutritional value; they won't adversely affect your cholesterol levels and they score a mere 85 calories each, so an egg-based breakfast on a fast day makes perfect sense. Two eggs plus a 50g serving of smoked salmon clocks in at a sensible 250 calories. Research recently found that individuals who consume egg protein for breakfast are more likely to feel full during the day than those whose breakfasts contain wheat protein.[21] Poaching or boiling an egg avoids the addition of careless calories. Stand down the toast soldiers and replace with steamed asparagus spears. For more suggestions about foods to keep you full and fit on a fast day, and the benefits certain choices will bring, turn to page 107-8.

How to fit fasting into your life

When to start?

If you do not have an underlying medical condition, and if you are not an individual for whom fasting is proscribed (see pages 123-4), then there really is no time like the present. Ask yourself: if not now, when? You

may prefer to await a doctor's advice. You may choose to prepare yourself, talk yourself down from a lifelong habit of overeating, clear out the fridge, eat the last cookie in the jar, have a scratch. Or you may want to get on with it and start to see visible progress within a couple of weeks. Do, however, begin on a day when you feel strong, purposeful, calm and committed. Do tell friends and family that you're starting the Fast Diet: once you make a public commitment, you are much more likely to stick with it. Avoid high days, holidays and days when you're booked in for a three-course lunch complete with bread basket, cheese board and four types of dessert. Recognise, too, that a busy day will help your fast time fly, while a duvet day generally crawls by like honey off a spoon. Once you've deliberated and designated a day to debut, get your mind in gear. Record your details – weight, BMI, target – before you start and note your progress in a diary, knowing that dieters who keep an honest account of what they eat and drink are more likely to lose the pounds and keep them off. Then… take a deep breath and relax. Better yet, shrug. It's no big deal: you have nothing to lose but weight.

How tough will it be?

If it has been a while since you have experienced hunger, even the slightest hint, you'll probably find that eating no

more than 500 or 600 calories in a day is a mild challenge, at least initially. Intermittent Fasters do report that the process becomes significantly easier with time, particularly as they witness results in the mirror and on the scales. Your first fast day should speed by, buoyed along by the novelty of the process; a fast day on a wet Wednesday in week three may feel more of a slog.

Your mission is to complete it, knowing that, although you are saying no to chocolate today, you will be eating what you want tomorrow. That is the joy of the Fast Diet and what makes it so different from other weight-loss plans.

How to win the hunger games

There is no reason to be alarmed by benign, occasional, short-term hunger. Given base-level good health, you will not perish. You won't collapse in a heap and need to be rescued by the cat. Your body is designed to go without food for longish periods, even if it has lost the skill through years of grazing, picking and snacking. Research has found that modern humans tend to mistake a whole range of emotions for hunger.[22] We eat when we're bored, when we're thirsty, when we're around food (when aren't we?), when we're in company or simply when the clock happens to tell us it's time for food. Most of us eat, too, just because it feels good. This is known as 'hedonic hunger' – and while

you should try to resist it on a fast day, you can bask in the knowledge that, if you please, you can give in to temptation the following day.

There's no need to panic about any of this. Simply note that the human brain is adept at persuading us that we're hungry in almost all situations: when faced with feelings of deprivation or withdrawal or disappointment; when angry, sad, happy, neutral; when subject to advertising, social imperatives, sensory stimulation, reward, habit, the smell of freshly brewed coffee or baking bread or bacon cooking in a café up the road. Recognise now that these are often learnt reactions to external cues, most of them designed to part you from your cash. If you are still processing your last meal, it's highly unlikely that what you are experiencing is true hunger ('total transit time', should you be interested in such things, can take up to two days, depending on your gender, your metabolism and what you've eaten).

While hunger pangs can be aggressive and disagreeable, like a box of sharp knives, in practice, they are more fluid and controllable than you might think. You're unlikely to be troubled at all by hunger until well into a fast day. What's more, a pang will pass. Fasters report that the feeling of perceived hunger comes in waves, not in an ever-growing wall of gnawing belly noise. It's a symphony of differentiated movements, not a steady, fearful crescendo. Treat a tummy rumble as a good sign, a healthy messenger.

Remember, too, that hunger does not build over a 24-hour period, so don't feel trapped in the feeling at any given moment.

Wait a while. You have absolute power to conquer feelings of hunger, simply by steering your mind, riding the wave, choosing to do something else – take a walk, phone a friend, drink tea, go for a run, take a shower, sing in the shower, phone a friend from the shower and sing… After a few weeks' practising Intermittent Fasting, people generally report that their sense of hunger is diminished.

The main struggle with doing the Fast Diet or any form of fasting is the first few weeks while your body and mind adjust to new habits, new ways of eating. The good news is that most people find they soon adapt. In fact many people have contacted us to say that it is unexpectedly easy.

Kimberley, who has been following the 5:2 method with her husband for some time, says: 'I am amazed at the energy I have during the Fast Days. It is not terribly difficult but is mildly challenging. I've done Weight Watchers over and over and this is so much easier. Many of my friends are interested to see how we do. So far, I feel like my belly has gone down. My hubby's blood pressure is down 10+ points, systolic and diastolic.'

The important thing is to have a strategy that works for you. David, for example, wrote, 'I find even a small breakfast triggers hunger for the rest of the day, so I avoid

eating anything until late on. You have to approach a Fast Day in the right mindset.'

So, take heart. On a Fast Day, refrain, restrain, divert and distract. Before you know it, you've retrained your brain and hunger's off the menu.

Tomorrow is another day: will power, patience and delayed gratification

Perhaps the most reassuring, and game-changing, part of the Fast Diet is that it doesn't last for ever. Unlike deprivation diets that have failed you before, on this plan, tomorrow will always be different. Easier. There may be pancakes for breakfast, or lunch with friends, wine with supper, apple pie with cream.

This On/Off switch is critical. It means that, on a fast day, though you're eating a quarter of your usual calorie intake, tomorrow you can eat as you please. There's boundless psychological comfort in the fact that your fasting will only ever be a short stay, a brief break from food.

When you're not fasting, ignore fasting – it doesn't own you, it doesn't define you. You're not even doing it most of the time. Unlike full-time fad diets, you'll still get pleasure from food, you'll still have treats, you'll engage in the regular, routine, food-related events of your normal life. There are no special shakes, bars, rules, points,

affectations or idiosyncrasies. No saying 'no' all the time.

For this reason, you won't feel serially deprived – which, as anyone who has embarked on the grinding chore of long-term every-day dieting, the kind that makes you want to commit hara-kiri right there on the kitchen floor every time you open the fridge door, is precisely why conventional diet plans fail.

The key, then, is to recognise, through patience and the exercise of will, that you can make it through to breakfast. Bear in mind that fasting subjects regularly report that the food with which they 'break their fast' tastes glorious. Flavours sing. Mouthfuls dance. If you've ever felt a lazy disregard for the food you consume without thinking, then things are about to change. There's nothing like a bit of delayed gratification to make things taste good.

Compliance and sustainability: how to discover a sensible eating pattern that works for you

Most diets don't work. You know that already. Indeed, when a team of psychologists at UCLA conducted an analysis of 31 long-term diet trials back in 2007, they concluded that 'several studies indicate that dieting is a consistent predictor of future weight gain… We asked what evidence there is that dieting works in the long term, and found that the evidence shows the opposite.' Their

analysis found that, while slimmers do lose pounds in the early months, the vast majority return to their original weight within five years, while 'at least a third end up heavier than when they embarked on the project'.[23] The standard approach clearly hasn't worked, doesn't work and won't work.

In order to be effective, then, any method must be rational, sustainable, flexible and feasible for the long haul. Adherence, not weight loss per se, is the key, so your goals must be realistic and the programme practical. It must fit into your life as it is, not the life of your dreams. It needs to go on holiday with you, it needs to visit friends, get you through a boring day at the office and cope with Christmas. To work at all, any weight-loss strategy has to be tolerable, organic and innate, not some spurious add-on that makes you feel awkward and self-conscious, the dietary equivalent of uncomfortable shoes.

While the long-term experience of Intermittent Fasters is still under investigation, people who have tried it comment on how easily it fits into everyday life. They still get variety from food (anyone who's ever tried to lose weight on 'only' grapefruit or cabbage soup will know how vital this is). They still get rewards from food. They still get a life. There is no drama, no desperate dieting, no self-flagellation. No sweat.

Flexibility: your key to success

Your body is not my body. Mine is not yours. So it's worth carving out your plan according to your needs, the shape of your day, your family, your commitments, your preferences. We none of us live cookie-cutter lives, and no single diet plan fits all. Everyone has quirks and qualifiers. That's why there are no absolute commandments here, just suggestions. You may choose to fast in a particular way, on a particular day. You may like to eat once, or twice, first thing or last. You may like beetroot or fennel or blueberries.

Some individuals prefer to be told exactly what to eat and when; others like a more informal approach. That's fine. It's enough to simply stick to the basic method – 500 or 600 calories a day, with as long a window without food as possible, twice a week – and you'll gain the plan's multiple benefits. In time, there's little need for assiduous calorie counting; you'll know what a fast day means and how to make it suit you.

The Maintenance Model

Once you've reached your target weight, or just a shade below (allowing room for manoeuvre and a generous slice of birthday cake), you may consider adopting the Maintenance Model. This is an adjustment to fasting on

only one day each week in order to remain in a holding pattern at your desired weight, but still reap the benefits of occasional fasting.

Naturally, one day a week – if that's what you choose – may offer fewer health benefits than two in the long run; but it does fit neatly into a life, particularly if you are not intent on achieving any further weight loss.

Equally, if the beach beckons or there's a wedding in the diary or you've woken up on Boxing Day haunted by that fourth roast potato, step it up again. You're in charge.

What to expect

The first thing you can expect from adopting the Fast Diet, of course, is to lose weight: some weeks more, some weeks less; some weeks finding yourself stuck at a disappointing plateau, other weeks making swifter progress. As a basic guide, you might anticipate a loss of around a pound with each fast day. This will not, of course, be all fat. Some will be water, and the digested food in your system. You should, however, lose around ten pounds of fat over a ten-week period, which beats a typical low-calorie diet. Crucially, you can expect to maintain your weight loss over time.

More important than what you'll lose, though, is what you're set to gain…

How your anatomy will change

Over a period of weeks, you can expect your BMI, your levels of body fat and your waist measurement to gradually fall. Your cholesterol and triglyceride levels should also improve. This is the path to greater health and extended life. You are already dodging your unwritten future. Right now, though, the palpable changes will start to show up in the mirror as your body becomes leaner and lighter.

As the weeks progress, you'll find that Intermittent Fasting has potent secondary effects too. Alongside the obvious weight loss and the health benefits stored up for the future, there are more subtle consequences, perks and bonuses that can come into play.

How your appetite will change

Expect your food preferences to adapt; pretty soon, you'll start to choose healthy foods by default rather than by design. You will begin to understand hunger, to negotiate and manage it, knowing how it feels to be properly hungry; you'll also recognise the sensation of being pleasantly full, not groaning like an immovable sofa. Satiated, not stuffed. The upshot? No more 'food hangovers', improved digestion, more bounce.

After six months of Intermittent Fasting, interesting things should happen to your eating habits. You may find

that you eat half the meat you once did – not as a conscious move, but as a natural one born of what you desire rather than what you decide or believe. You're likely to consume more veg. Many Intermittent Fasters instinctively retreat from bread (and, by association, butter), while stodgy 'comfort' foods seem less appealing and refined sugars aren't nearly as tempting as they once were. The bag of Haribo in the glove box of the car? Take it or leave it.

Of course, you don't need to dwell actively on any of this. It will happen anyway. If you are like me, then one day soon, you'll arrive at a place where you say no to the cheesecake because you don't fancy it, not because you are denying yourself a treat.

This is the baseline power of Intermittent Fasting: it encourages you to recheck your diet. And that's your long-haul ticket to health.

How your attitude will change

So, yes, you'll start to lose bad habits around food. But if you continue to fast – and feast – with awareness, all kinds of other changes should occur, some of them unlikely and unexpected.

You may, for instance, discover that you've been suffering from 'portion distortion' for years, thinking that the food piled on your plate is the quantity you really

need and want. With time, you'll probably discover that you've been overdoing it. Muffins will start to look vast as they sit, fat and moist, under glass domes in coffee shops. A maxi bag of crisps becomes a monstrous prospect. You may go from Venti to Grande to wanting only half a cup, no sugar, no cream.

Soon, you'll come to recognise the truth about how you've been eating and the wordless fibs you've told yourself for years. This is as much a part of the recalibrating process as anything else; you've changed your mind. Occasional fasting will train you in the art of 'restrained eating'; in the last instance, this is the goal. It's all part of the long game of behavioural change that means that the Fast Diet will ultimately become neither a fast, nor a diet, but a way of life.

After a while, you'll have cultivated a new approach to eating – thoughtful, rational, responsible – without even knowing you're doing it.

Intermittent Fasters also report a boost in their energy, together with an amplified sense of emotional wellbeing. Some talk of a 'glow' – the result, perhaps, of winning the battle for self-control, or of the smaller clothes and the compliments, or of something going on at a metabolic level that governs our moods. We may not yet know precisely why, but whatever it is, it feels good. Far better than cake. As one online devotee says, 'Overall, fasting just seems right. It's like a reset button for your entire body.'[24]

More subtly still, many fasters acknowledge a sense of relief as their fast days no longer revolve around food. Embrace it. There's a certain liberty here, if you allow it to materialise. You may find, as we have, that you start to look forward to your fasts: a time to regroup and give feeding a rest.

The Fast Diet in reality: tales, tips and troubleshooting

How men fast: Michael's experience

A lot of men have contacted me over the last few months to let me know how much weight they have lost and also to say how surprised and delighted they are that Intermittent Fasting turns out to be so easy. They like its simplicity, the fact that you don't have to give things up or try to remember complicated recipes. I also think they rather like the challenge.

The actor and comedian Dom Joly recently wrote that he'd lost two and a half stone after watching my *Horizon* programme and felt it was an approach he could imagine sticking to for the rest of his life.[25] The attraction for him is that he knows he will be able to eat what he wants the following day. He even added that he now rather enjoys the fasting days, something I have heard from a

number of men. One of the things that men seem to like particularly about fasting is that they can fit it into their lives with minimal hassle. It doesn't stop them working, travelling, socialising or exercising. In fact, some find it fuels performance (see page 121 for more on fasting and exercise).

In one Belgian study, men asked to eat a high-fat diet and exercise before breakfast on an empty stomach put on far less weight than a similar group of men on an identical diet who exercised after breakfast.[26] This study adds support to the claim that exercising in a fasted state makes the body burn a greater percentage of fat for fuel. At least it does if you are a man.

For me, a fast day now follows a familiar routine. I start with a protein-rich breakfast, normally scrambled eggs or kippers. I drink several cups of black coffee and tea during the day, work happily through lunch and rarely feel any hunger pangs until well into the late afternoon. When they happen, I simply ignore them or go for a brief stroll until they pass.

In the evening I have a bit of meat or fish and piles of steamed vegetables. Having abstained since breakfast I find them particularly delicious.

I never have problems getting to sleep and most days wake up the next morning feeling no more peckish than normal.

How women fast: Mimi's experience

While most men I know respond well to numbers and targets (with associated gadgets if at all possible), I've found that women tend to take a more holistic approach to fasting. As with much in life, we like to examine how it feels, knowing that our bodies are unique and will respond to any given stimulation in their own sweet way. We respond to shared stories and the support of friends. And, sometimes, we need a snack.

Personally, for instance, I like to consume my fast-day calories in two lots, one early, one late, bookending the day with my allowance and aiming for a longish gap in between to maximise the prospect of health gains and weight loss. But I do need a little something to keep me going in between. A fast-day breakfast is usually a low-sugar muesli, perhaps including some fresh strawberries and almonds, with semi-skimmed milk; there'll be an apple 'for lunch' – hardly a feast, I know, but just enough to make a difference to the day. Then, supper: a substantial, interesting salad with heaps of leaves and some lean protein – perhaps smoked salmon or tuna or hummus – once the kids are in bed. Throughout the day, I drink San Pellegrino mineral water with a squeeze of lime, tons of herbal tea and plenty of black coffee. They just help the day tick by.

In the four months since I started the Fast Diet, I have lost 6kg, and my BMI has gone from 21.4 to 19.4. If you're

struggling with bigger numbers than these, take strength from the fact that heavier subjects respond brilliantly to Intermittent Fasting, and the positive effects should be apparent in a relatively short time. These days, one fast a week (on Mondays) seems to suffice and keep me at a stable, happy weight.

Many women I encounter are well versed in dieting techniques (years of practice), and I've found that a couple of tips can come in handy on a fast day. I'd recommend, for instance, eating in small mouthfuls, chewing slowly and concentrating when eating. Why read a magazine, why tweet as you eat? If you're only getting 500 calories, it makes sense to notice them as they go in.

I have found, like many Intermittent Fasters, that hunger is simply not an issue. For whatever reason – and one wonders whether it suits the food industry – we have developed a fear of hunger, fretting about low blood sugar and whatnot.

On the whole, for me, a day with little food feels emancipating rather than restrictive. That said, there are ups and downs: some days skim by like a stone on water; other days, I feel like I'm sinking, not swimming, perhaps because emotions or hormones or simply the tricky business of life have kicked in. See how you feel, and always give in gracefully if that particular day is not your day to fast.

A dozen ways to make the Fast Diet work for you

1. *Know your weight, your BMI and your waist size from the get-go.* As we mentioned earlier, waist measurement is a simple and important measurement of internal fat and a powerful predictor of future health. People who do Intermittent Fasting soon lose those dangerous and unattractive inches. BMI is your weight (in kilograms) divided by your height (in metres) squared; it may sound like a palaver, and an abstract one at that, but it's a widely accepted tool for plotting a path to healthy weight loss. Do note that a BMI score takes no account of body type, age or ethnicity, so should be greeted with informed caution. Still, if you need a number, this is a useful one.

Weigh yourself regularly but not obsessively. After the initial stages, once a week should suffice. The mornings after fast days are best if you like to see falling figures. You may discover that your weight measurement is significantly different from feed day to Fast Day. This discrepancy may well be due to the additional weight of food in your system, rather than changes in your fat mass from one day to the next. You may like to take an average over several days to arrive at a reasonable figure for any weight loss. But don't overdo it; try not to make weighing – yourself or your calories – a chore.

If you are someone who enjoys structure and clarity, you may want to monitor your progress. Have a target in mind. Where do you want to be, and when? Be realistic:

precipitous weight loss is not advised, so allow yourself time. Make a plan. Write it down.

Plenty of people recommend keeping a diet diary. Alongside the numbers, add your experiences; try to note down three good things that happen on each day. It's a feel-good message that you can refer to as time goes by.

2. *Find a fast friend.* You need very few accoutrements to make this a success, but a supportive friend may well be one of them. Once you're on the Fast Diet, tell people about it; you may find that they join in, and you'll develop a network of common experience. Since the plan appeals to men and women equally, couples report that they find it more manageable to do it together. That way, you get mutual support, camaraderie, joint commitment and shared anecdotes; besides, meal times are made infinitely easier if you're eating with someone who understands the rudiments of the plot. There are plenty of threads on online chat rooms too. Mumsnet is a great source of support and information. It's remarkable how reassuring it is to know that you're not alone.

3. *Prep your fast-day food in advance* so that you don't go foraging and come across a leftover sausage lurking irresistibly in the fridge. Keep it simple, aiming for fast-day flavour without effort. Shop and cook on non-fast days, so as not to taunt yourself with undue temptation

(For simple, sustaining fast-day recipe ideas, see pages 139-61). Before you embark, clear the house of junk food. It will only croon and coo at you from the cupboards, making your fast day harder than it needs to be.

4. *Check calorie labels for portion size.* When the cereal box says 'a 30g serving', measure it. Go on. Be amazed. Then be honest. Since your calorie count on a fast day is necessarily fixed and limited, it's important not to be blinkered about how much is actually going in. You'll find a calorie counter for suggested fast-day foods on page 185. Or download a calorie counter app such as www.myfitnesspal.com. Nutratech.co.uk offers a useful online interactive food diary – go to www.nutratech.co.uk. Alternatively, www.nutritiondata.self.com includes specific search criteria to allow you to match your food choices not only to your calorie allocation but also to your nutritional needs. Way more importantly, don't count calories on a non-fast day. You've got better things to do.

5. *Wait before you eat.* Try to resist for at least ten minutes, 15 if you can, to see if the hunger subsides (as it naturally tends to do). If you absolutely must snack, choose something that will not elevate your insulin levels. Try some julienned carrots, a handful of plain air-popped popcorn, an apple slice or some strawberries. But don't pick and peck like a hen through the day; the calories will soon stack up and your fast will be dashed. On

fast days, eat with awareness, allowing yourself to fully absorb the fact that you're eating (not as daft as it sounds, particularly if you have ever sat in a traffic jam popping M&Ms). Similarly, on off-duty days, stay gently alert. Eat until you're satisfied, not until you're full (this will come naturally after a few weeks' practice). Work out what the concept of 'fullness' means for you – we are all different and it changes over time.

6. *Stay busy.* 'We humans are always looking for things to do between meals,' said Leonard Cohen. Yes, and look where it's got us. So fill your day, not your face. As fasting advocate Brad Pilon has noted, 'No one's hungry in the first few seconds of a sky dive.' Engage in things other than food – not necessarily sky diving, but anything that appeals to you. Distraction is your best defence against the dark arts of the food industry, which has stationed donuts on every street corner and nachos at every turn. And remember, if you must have that donut, it will still be there tomorrow.

7. *Try the two-to-two*: fasting not from bedtime to bedtime, but from 2pm until 2pm. After lunch on day one, eat sparingly until a late lunch the following day. That way, you lose weight as you sleep and no single day feels uncomfortably deprived of food. It's a clever trick, but it does require a modicum more concentration than the whole-day option. Or perhaps fast from supper to supper,

which again means that no day is All Fast and No Fun. The point is that this plan is 'adjust to fit'. Just like your waistband in three weeks' time…

8. *Don't be afraid to think about food you like.* A psychological mechanism called 'habituation' – in which the more people have of something, the less value they attach to it – means that doing the opposite and trying to suppress thoughts of food is a 'flawed strategy'.[27] The critical thought process here is to treat food as a friend, not as a foe. Food is not magical, supernatural or dangerous. Don't demonise it; normalise it. It's only food.

9. *Stay hydrated.* Find no-calorie drinks you like, and then drink them in quantity. Some swear by herbal tea; others prefer a mineral water with bubbles to dance on the tongue, though tap water will do just as well. Plenty of our hydration comes through the food we eat, so you may need to compensate with additional drinks beyond your routine intake (check your urine; it should be plentiful and pale). While there's no scientific rationale for drinking the recommended eight glasses of water a day, there is good reason to keep the liquids coming in. A dry mouth is the last sign of dehydration, not the first, so act before your body complains, recognising too that a glass of water is a quick way to hush an empty belly, at least temporarily. It will also stop you mistaking thirst for hunger.

10. *Don't count on weight loss on any given day.* If you have a week when the scales don't seem to shift, dwell instead upon the health benefits you will certainly be accruing even if you haven't seen your numbers drop. Remember why you're doing this: not just the smaller jeans, but the longterm advantages, the widely accepted disease-busting, brain-boosting, life-lengthening benefits of Intermittent Fasting. Think of it as a pension plan for your body.

11. *Be sensible, exercise caution, and if it feels wrong, stop*. It's vital that this strategy should be practised in a way that's flexible and forgiving. It's OK to break the rules if you need to. It's not a race to the finish, so be kind to yourself and make it fun. Who wants to live longer if life's an abject misery? You don't want to grunt and sweat under a weary life. You want to go dancing. Right?

12. *Congratulate yourself.* Every completed fast day means potential weight loss and quantifiable health gain. You're already winning.

Q & A

Which days should I choose to fast?

It really doesn't matter. It's your life, and you'll know which days will suit you best. Monday is an obvious choice for many, perhaps because it is more manageable,

psychologically and practically, to gear yourself up at the beginning of a new week, particularly if it follows a sociable weekend. For that reason, fasters might choose to avoid Saturdays and Sundays, when family lunches and brunches, dinner dates and parties make calorie-cutting a chore. Thursday would then make a sensible second fasting day, chiming, if such things appeal, with the teachings of the Prophet Mohammed, who is understood to have fasted on the second and fifth days of the week. But be flexible; don't force yourself to fast when it feels wrong. If you're particularly stressed, off-colour, tired or peevish on a day that you have designated a fast, try again another day. Adapt. This is not about one-size-fits-all rules; it's about finding a realistic pattern that works for you. Do, however, aim for a pattern. That way, over time, your fasts will become familiar, a low-key habit you accept and embrace. You may adapt your fasts as your life (and your body) changes shape – but don't drop too many fast days; there is a danger that you'll slide back into old habits. Be kind. But be tough.

Does it have to be for 24 hours?

Fasting for a 24-hour period is practical, coherent and unambiguous, all of which will promise a greater chance of success. It is, however, merely the most convenient way of organising a fast: there's nothing magical about 24 hours. To save on bother, stick to it, and remind yourself that you'll be asleep for nearly a third of it.

Should I fast on consecutive days?

Many of the studies done to date on humans have involved volunteers fasting on consecutive days; there is certainly value in doing back-to-back fasts, but as far as we are aware, there are no studies on humans comparing this approach with split days. We do, however, know what works in practice for fasters like us. Michael tried the consecutive system and found it too challenging to be sustainable over time, so he switched to the split version – fasting on Mondays and Thursdays. The weight loss, improvements in glucose, cholesterol and IGF-1 that he saw are all based on this non-consecutive, two-day pattern.

There's a psychological imperative here too: fast for more than a day at a time, and you may start to feel resentful, bored and beleaguered – precisely the feelings that wreck the best-made diet intentions. A critical part of this plan is that you never feel challenged for long enough to consider quitting. By the time you've had enough, breakfast is on the table and another fast has passed.

How much weight will I lose?

This will depend largely on your own metabolism, your individual body type, your starting weight, your level of activity and how effectively and honestly you fast. In the first week, you may experience water loss that can account for a significant dip on the scales; with time, your weekly calorie deficit will mean, thanks to the simple law of thermogenics (energy in < energy out = weight loss), that

you will be losing fat. Be judicious: abrupt weight loss is not advised and shouldn't be your aim. You may, however, anticipate losing around half a stone in eight weeks.

I know I should stick to low GI foods on a fast day. So which foods are best?

As we've seen, foods with a low GI or GL will help keep your blood sugar stable, increasing your chances of a successful day with few calories. Vegetables and legumes are, needless to say, amazing, and you should rely on them on a fast day. Packed with nutrients, their bulk fills you up, they have relatively few calories and they keep your blood sugar low. Carrots are a great snack, particularly with hummus dip, which scores an astonishing GI of 6 and a GL of 0. Fruit is handy too, though some fruits are more fast-friendly than others.

Check the GI count of your chosen fast-day foods online. Diabetes UK has an excellent guide at www.diabetes.org.uk.

Or look at the GI Index from the University of Sydney on www.glycemicindex.com, noting that some foods have an unexpected count. Staples, for instance, are worth scrutinising with an eagle eye:

STAPLES	GI	GL
BROWN RICE	48	20
WHITE RICE	76	36

	GI	GL
PASTA durum wheat	40	20
COUSCOUS	65	23
POTATOES BOILED	58	16
MASHED	85	17
FRIED	75	22
BAKED	85	26

The biggest surprise regarding the staples is how big an effect baking or mashing potatoes has on blood sugars. On fast days, avoid these starchy basics, and substitute with plenty of greens. Fill your plate. Watch out for fruit too. Some are your fast friends; others will spike your blood sugar and are best left for the days when you are eating freely.

FRUIT	GI	GL
STRAWBERRIES	38	1
APPLES	35	5
ORANGES	42	5
GRAPES	45	9
PINEAPPLE	84	7
BANANAS	50	12
RAISINS	64	30
DATES	100	42

Eating the whole fruit will keep you feeling full for longer.

Strawberries, without sugar, are extraordinarily low GI/GL and also low calorie (no wonder many fasters eat a bowl for breakfast). The striking thing to note is the high sugar impact of raisins and dates. Avoid them on fast days. For more on calorie levels, refer to the Counter on page 185.

I've read about 'super-foods' and 'intelligent eating'. Should I include super-foods during a fast day?

The term 'super-food' is more of a marketing ploy than a scientific construct, and clinical nutritionists are loath to use the description. All plants produce a huge range of phytochemicals that can have a beneficial role in the body: eat them on a fast day or, indeed, on any day you please. The following foods taste good and they're generally low in calories – making them ideal fast-day companions:

- **FRUIT:** As the labs of the world continue in their quest for new anti-obesity marvels, the latest to emerge is the humble tangerine. Citrus fruits in general, and tangerines in particular, contain high concentrations of nobiletin, a compound that 'protects from obesity and atherosclerosis' – in lab mice at least.[28] If you like tangerines, eat them, perhaps spending time meditatively peeling away the pith. The same group of researchers previously found that grapefruit, rich in a compound called naringenin, encourages the liver to burn fat rather than store it.[29] Grapefruit also contains

compounds such as liminoids and lycopene (thought to have anti-cancer properties),[30] and clocks in at only 39 calories per half, making it a good fast-day food. (You should, however, be aware that grapefruit interacts with a number of common medicines, so if you are taking medication such as statins, consult your doctor.) Alternatively, you could always throw in a watermelon smile (30 calories per 100g) or an apple (around 50 calories per 100g) for flavour, crunch and pectin, a soluble fibre that can't be absorbed by the body but is useful in fat digestion.[31] Apples are the ultimate convenience food, though they are quite high in calories; eat the whole thing, skin, pips and core – you'll probably want to if it's one of your fast day treats. Tomatoes also contain lycopene, which may help guard against cancer[32] and stroke.[33] A handful of cherry tomatoes or strawberries (low GI, low GL) could be your best bet to get you through a tummy rumble unscathed. Check for calorie traps before you eat (see the Calorie Counter on page 185)

- **BERRIES:** Blueberries are high in antioxidant polyphenols and phytonutrients. New research has found that these bold little berries may also be able to break down fat cells in the body and prevent new ones from forming.[34] Pretty impressive, eh? Even if you don't buy the science, blueberries remain a handy source of vitamin C. Once you're berry savvy, you may want to

cruise your local healthfood store for other super-foods: goji, acai, aloe, hemp seeds, chia seeds and spirulina (a nutrient-rich blue-green alga). All curious, all good

- **VEGETABLES:** Again, aim for a broad variety – different colours, textures, tastes, shapes. Steamed broccoli contains a whole world of nutrients (including vitamin K). Green beans love a little lemon and garlic. Fennel is great if shaved (invest in a mandolin), perhaps teamed with orange segments and a squeeze of the juice. Edamame are a good source of low-fat protein and omega 3 fatty acids. Starchy veg, of course, tend to have a higher GL and calorific value, though they are satiating. Proceed with caution and don't add butter

- **LEAVES:** It goes without saying that green leafy veg are your fast-day friends. Spinach, kale, chard, mustard greens, salad leaves… a veritable vit fest, and agreeably low in calories. Pep things up with chilli flakes, ginger, cumin, pepper, lemon juice, garlic. Garlic, by the way, contains allicin, the active ingredient that lends it pungency and is also thought to protect cells and reduce fatty deposits,[35] so be liberal and carry (sugarless) mints

- **HERBS AND SPICES:** Low-cal, high-impact, no brainer. Pickles may work for you too – cornichons, jalapenos,

onions (watch the GI values) – or mustard; anything, really, that brings a bolt of fire or flavour to your plate

- **NUTS:** We've established that nuts are a fast-day favourite: filling and low GI. Almonds, though calorific, are high in protein and fibre which makes them brilliantly satiating; pistachios too (better yet, they take ages to crack and eat). Cashews and coconut flakes will help animate a salad. But count wisely: nut calories soon clock up

- **SEEDS:** Sunflower seeds contain good fats, together with iron, zinc, potassium, vitamins E and B1, magnesium and selenium – all that goodness in a tiny little packet

- **SOUP:** Scientists at Penn State University have found that soup is a great appetite suppressant.[36] Go for a light broth, a miso soup, a kicky pho; choose carrot and coriander over a creamy chowder

- **CEREALS:** Oats are a standby low GL staple, but mix it up; you could experiment with bulgar, couscous or quinoa – it's high in protein and fibre, easy to cook and a good source of iron

- **DAIRY:** Milk products, though full of protein and calcium, can also be high in fat. Opt for low-fat

alternatives – and save the cheese board for tomorrow. Fat-free or low-fat yoghurt will bring protein, potassium (and, if you want them, pro-biotics) along to the party, and, like nuts, it will help you feel fuller longer. But beware; it can also be high in sugar.

Whatever you eat on a fast day (or any day), the most important thing is to relish it. Go slow. Have a look at the menu plans on pages 139-61 for more ideas.

I know I need plenty of veg, but should I eat it raw or cooked?

There is some debate as to whether vegetables are best eaten raw or cooked; cooking may, as raw-foodists contend, destroy vitamins, minerals and enzymes, but it also softens cellulose fibres, making nutrients more available for take-up in the body. Lycopene, a potent antioxidant found in tomatoes, is boosted in cooking.[37] A small blob of ketchup is no bad thing. Meanwhile, boiled or steamed carrots, spinach, mushrooms, asparagus, cabbage, peppers and many other vegetables also supply more antioxidants, such as carotenoids and ferulic acid, to the body than they do when raw.[38] The downside of cooking veg is that it can destroy their vitamin C. The raw versus cooked argument is a complicated one. Our best advice? Eat plenty of vegetables, just the way you like them.

Can I eat what I like on off-duty days?

Counter-intuitive as it may seem, no foods are off-limits, none proscribed. On the five days a week when we're not restricting calories, we both eat fish and chips, roast potatoes, biscuits, cake.

The whole point of the 5:2 approach is that for five days a week you shouldn't feel as if you are on a continuous, diet. Even so, don't try to gorge in a bid to make up for lost time, like a contestant in a blueberry pie contest. You could compensate for fasting by grossly overeating the next day, but it's very hard to do and you probably won't want to. We are creatures of habit, which makes it difficult for us to change our ways. But ingrained habits can also be helpful – after a fast people seem to find it relatively easy to step back into normal eating.

This absence of 'hyperphagia' (excessive appetite) after a day of rationing calories may seem surprising, but it is borne out by anecdotal experience. Many fasters report not feeling particularly hungry the day after a fast; what's more, many people discover that their life-long love of high-sugar, high-fat foods seems to diminish as Intermittent Fasting becomes a way of life. As yet, we can only speculate as to why this may be the case, but some individuals certainly experience a galvanizing effect from the weight loss they achieve: as they drop the pounds, their resolve grows stronger and eating more healthily, cutting back on pizzas, pies and potatoes, seems a natural lifestyle change.

Humans have, however, evolved to prefer calorie-rich foods – it once gave us an edge – and perhaps the greatest advantage of the Fast Diet is that it expressly includes 'pleasure foods', on five days of the week. For most of the time, there is no limitation, no deprivation, no guilt. The psychological impact of not being denied is huge; it frustrates what's known as the 'disinhibition effect' – a paradox in which designating certain foods 'off limits' makes us likely to eat more of them.[39]

Remember, then, that this is not a cycle of bingeing and starving: it is calibrated and moderate. Studies and experience show that Intermittent Fasting will regulate the appetite, not make it more extreme. You could pig out on your non-fast days, working your way steadily through all the ice-cream flavours in the freezer. (Even if you did, you'd still get some of the metabolic benefits of fasting.) But you won't do that. In all likelihood, you'll remain gently, intuitively attentive to your calorie intake, almost without noticing.

Similarly, you may find yourself naturally favouring healthier foods once your palate is modified by your occasional fasts. So, yes, eat freely, forbid nothing, but trust your body to say 'when'.

Is breakfast important?

Dieting lore has long suggested that breakfast is the most important meal of the day – miss it in the morning and it's like leaving the house without a coat. But that's not

necessarily the case. Recent research shows that a bigger breakfast begets a bigger lunch (and a bigger dinner), which – no surprises here – means a higher overall calorie count for the day.[40] Some fasters find that they need sustenance to start the day, others may prefer to wait until later to 'break their fast'. It's up to you, and whichever pattern you choose may change over time.

What can I drink?

Plenty – as long as it doesn't have a substantial calorie content. In practice, as with most decisions on the Fast Diet, the choice is entirely up to you. Drink plenty of water – it's calorie-free, actually free, more filling than you think and will stop you confusing thirst for hunger. In summer, add rounds of cucumber or a dash of lime. Freeze it and suck on cubes. If you want warmth, miso soup contains protein, feels like food and clocks up only 84 calories per cup; vegetable bouillon pulls off the same trick. If you find it hard to sleep, a mug of instant low-cal hot chocolate is under 40 calories and a comforting thought.

During the day no-cal drinks are best. Hot water with lemon is a standby favourite for fasters, but you might prefer to add mint leaves or a scattering of cloves, a slice of ginger root or some lemongrass. If you are fond of herbal teas, try some unfamiliar flavours to spice up the day (liquorice and cinnamon, lemon grass and ginger, lavender, rose and chamomile…) Green tea may have

health-giving antioxidant properties (the jury's out), but if you like it, drink it.

On fast days we drink our tea and coffee black and sugarless; if you prefer it with milk and artificial sweeteners, fine. But beware that the calories in milk add up, and what you are trying to do is extend the time you are not consuming any calories at all.

While fruit juices are seen as healthy, they generally have a surprisingly high sugar content, are lower in fibre than a whole fruit and can rack up the stealth calories without so much as a by-your-leave. Commercial smoothies can have a similar sugar content to Coke and, because they are acidic, they are corrosive to your teeth; they are also loaded with calories. If you need flavour, swap juice and smoothies for very dilute cordials – perhaps a dash of elderflower with fizzy water and lots of ice.

What about alcohol?

Alcoholic drinks, though pleasant, merely provide 'empty' calories. One glass of white wine contains about 120, while a 550ml can of beer has 250. Unless you really can't say no, abstain absolutely on a fast day – it's a golden opportunity to slash your weekly consumption without feeling serially deprived. Think of it as an alcovoid, for two achievable days each week.

And caffeine?

There's a growing body of evidence to suggest that – far

from being a guilty pleasure – drinking coffee may be good for you, helping to prevent mental decline, improve cardiac health and reduce the risk of liver cancer and stroke.[41] So go ahead, drink coffee if that's what gets you going and keeps you going each day. It's a useful weapon in your arsenal against boredom, and coffee breaks can pleasantly punctuate your day. There's no metabolic reason to avoid caffeine during a fast, but if you have trouble sleeping, limit your intake later in the day. You should, of course, drink it black. A 16 fl oz caramel macchiato has 224 calories… Just saying.

How about snacks?

The general idea of the Fast Diet is to give your body an occasional holiday from eating. Let your mouth rest. Give your belly a break. If you must snack on a fast day, do it with awareness and frugality, always keeping a weather eye on the GI:

	GI	GL
NUTS	27	3
POPCORN	72	8
RICE CAKES	80	19
FRUIT BARS	93	20
MARS BAR	65	26

You knew that chocolate bars were hardly a health food, but did you know how sugary rice cakes and fruit bars can be? Bear in mind that processed foods tend to

have hidden sugars and, though convenient, won't give you anything like the nutritional advantage of good old-fashioned plants and proteins. Try carrot or celery sticks with hummus, or a handful of nuts – always factoring them into your daily calorie count (don't cheat).

Habitual snacking, even on low-calorie, nutrient-rich foods, is not advised; part of the motive here is to retrain your appetite, so don't overstimulate it. If your mouth is desperate for attention, give it a drink.

Can I use meal-replacement shakes to get me through the early days?

A number of people say that commercially available meal-replacement shakes helped them through the first, and normally hardest, weeks of an intermittent fast. Arguably, shakes are simpler than calorie-counting, and on your fast day you could simply sip away when waves of hunger strike. We are not great fans as we think real food is better. But if you find it helps, by all means try it. It's best to go for brands that are low in sugar.

What are the implications of cheating and having a few crisps or a cookie?

To clarify: this is a book about fasting, the voluntary abstention from eating food. The reasons why this is good for you go way beyond the fact that you are simply eating fewer calories. They arise because our bodies are designed for intermittent fasts. As you've seen, the

scientific term is hormesis; what does not kill you makes you stronger. So while starvation is bad, a little bit of short, sharp, shock food restriction is good.

Your aim, then, is to carve out a food-free breathing space for your body. Going to 510 calories (or 615 for a man) won't hurt – it won't obliterate a fast. Indeed, the idea of slashing calories to a quarter of your daily intake on a fast day is simply one that has been clinically proven to have systemic effects on the metabolism. While there's no particular 'magic' to 500 or 600 calories, do try to stick resolutely to these numbers; you need clear parameters to make the strategy effective in the medium term.

Having 'an extra cookie' on a fast day would be antithetical to your goals (not to mention the fact that it would probably spike your blood sugar and eat up most of your allowance in one buttery bite); when you're fasting, you need to think sensibly and coherently about your food choices, following the plan laid out here. Exercise will-power, reminding yourself that tomorrow is on its way.

Should I take supplements during my fast?

The Fast Diet is an intermittent method, not a deprivation regime, so your nutritional intake from a wide variety of food sources should remain relatively steady over time, providing all the vitamins and minerals you require. If, as recommended, your fast-day foods centre on protein and plants, they'll give you all the goodness you need so you

won't have to resort to costly bottled multivitamins. Do, however, choose your fast-day foods with care, ensuring that, over the course of a week, you consume adequate B vitamins, omega 3s, calcium and iron. Be sensible and eat well. While we are not fans of bottled vitamins and minerals, if a qualified health professional has suggested a particular supplement, you should continue to take it.

Should I exercise on a fast day?

Why not? In the interests of flexibility and normality, there's no reason to change your usual pattern of activity while fasting. Research demonstrates that even a more extreme three-day total fast has no negative effect on the ability to perform short-term, high-intensity workouts or long-duration, moderate-intensity exercise. Athletes seem to suffer no loss in performance during occasional fasting; a 2008 study of Tunisian footballers during Ramadan found that fasting had no effect on performance ('Each player was assessed for speed, power, agility, endurance, and for passing and dribbling skills. No variables were negatively affected by fasting.')[42]

In fact – and this is worth noting if you are aiming for optimal fitness – training while fasting can result in better metabolic adaptations[43] (which means enhanced performance over time), improved muscle protein synthesis,[44] and a higher anabolic response to post-exercise feeding.[45, 46]

Training on an empty stomach turns out to be beneficial on multiple levels, coaxing the body to burn a greater

percentage of fat for fuel instead of relying on recently consumed carbs; if you're burning fat, don't forget: you're not storing it. As we've seen, one recent study found that working out before breakfast is beneficial for metabolic performance and weight loss.[47] A report in *The New York Times* suggests that it even 'blunts the deleterious effects of over-indulging' – making fasted exercise a canny way of 'combating Christmas'.[48] According to the study's authors, 'Our current data indicate that exercise training in the fasted state is more effective than exercise in the carbohydrate-fed state.' Certainly food for thought. Do not, however, increase your fast-day food allowance to 'compensate' for calories burned through exercise: on a fast day, stick to 500 or 600 calories, whatever level of activity you choose. That's where the benefits lie.

Are there gender differences in response to Intermittent Fasting ?

Clearly, men and women have metabolic and hormonal differences; for evolutionary reasons, we store and utilise fat in different ways. Women carry more fat, are better at storing it and tend to be more efficient at burning fat in response to exercise.[49] Though few studies have been done, there's some evidence to suggest that fasting women have a better response to endurance training than weight training,[50] while men may fare better with weights. Anecdotally, men tend to find working out on an empty stomach easier to accomplish than women.

In terms of general health, the benefits of occasional, short-term fasting for both sexes are pretty clear. Although quite a few studies have been done with male volunteers, others have been done with a mixed group or mainly female volunteers. The volunteers who took part in Michelle Harvie's studies, well over 200 of them, were all women. Their results are striking and positive; nevertheless, further trials are required to analyse the precise effects of fasting on hormones, particularly among women of different ages. As with all recommendations in this book, be cautious and self-aware. This is not meant to be a struggle; it's intended as a well-marked route to good health. If, for whatever reason, short bouts of fasting interrupt your cycle or your sleep pattern, modify your approach till you find a comfortable balance that works for you.

Can I fast if I'm trying to get pregnant?

The science is still unfolding, and there haven't been enough clinical trials to assess the overall effects of fasting on fertility. According to Professor Mark Mattson, an Intermittent Fasting plan, such as the Fast Diet, will not affect fertility. More extreme fasting may. It does in animals, but in a reversible manner. Nonetheless, we err on the side of caution and suggest that if you are trying to get pregnant, you should not fast. Period.

You should certainly not fast if you are already pregnant. Pregnant women should eat according to government

guidelines and not limit their calorie intake.

Who else shouldn't fast?

There are certain groups for whom fasting is not advised. Type 1 diabetics are included in this list, along with anyone suffering from an eating disorder. If you are already extremely lean, do not fast. Children should never fast; they are still growing and should not be subject to nutritional stress of any type. If you have an underlying medical condition, visit your GP, as you would before embarking on any weight-loss regime.

Will I get headaches?

If you do, it may be due to dehydration rather than a lack of calories. You might experience mild withdrawal symptoms from sugar (or caffeine if you've dropped it), but the brevity of your fast shouldn't make this of particular concern. Keep drinking water. Treat a headache as you would normally; if fasting today is making you feel particularly unwell, stop. You are in charge.

Should I worry about low blood sugar?

If in reasonable good health, your body is a remarkably efficient and functional machine, capable of – in fact, designed for – the effective regulation of blood sugar. Short-term fasting is unlikely to yield a hypoglycaemic response. The recently propagated idea that we need to graze to avoid a 'blood sugar crash' is a myth; if you

follow the guidelines set out here and eat low-GI foods on a fast day, your blood glucose should remain stable. But don't overdo it. If you fast for extended periods, longer than the bi-weekly, 24-hour modified eating programme recommended here, you may experience a drop in blood pressure, a drop in glucose levels and dizziness. So, fast smart. If you are diabetic, consult your doctor before embarking on any dietary change.

Will I feel tired?

Short-term, deliberate, modified fasting will not leave you beat – some fasters even report an energy boost on a Fast Day and beyond. As in normal life, you'll undoubtedly have up days and down days, good days and bad. Anecdotally, many Intermittent Fasters we have encountered report an increase in energy rather than a depletion. See how you fare. You may find that a fast day ends earlier than usual – no alcohol and plentiful sleep being a great way to arrive at breakfast sooner.

But will I go to bed hungry?

Probably not, though it will depend on your particular metabolism, and how you timed your fast-day calorie consumption. If you feel hungry, take your mind off it – a bubble bath, a good book, a stretch out, a herbal tea. Get psychology on your side: congratulate yourself on reaching the end of another fast day. Surprisingly, perhaps, fasters report that they don't wake up ravenous

and run to the fridge as soon as the alarm goes off. Hunger is a subtle beast, and your appetite will soon find its rhythm.

Will my body go into 'starvation mode' and hang on to fat?

Since you're not restricting calories every day, your body will not enter the fabled 'starvation mode'. Your fasting will never be intense. It will only ever be conservative and short-lived, so while your body will burn energy from its fat stores, it will not consume muscle tissue. Research has shown that occasional fasting does not suppress the metabolism.[51] Even extreme fasting – an absolute fast for three consecutive days[52] or on every other day for three weeks[53] – generates no decrease in basal metabolic rate. Nor does Intermittent Fasting raise levels of the hunger-stimulating hormone ghrelin. Researchers at Pennington Biomedical Research Center in Louisiana found that 'ghrelin was unchanged in both the men and the women, even after 36 hours of fasting'.[54] If you follow the moderate, judicious approach advised here, a short window without food is a scientifically sanctioned path to health and wellbeing.

What if everyone around me is eating on one of my fast days?

Participate, but with a nonchalant awareness. While support from family and friends is an asset, making a song and dance about your fast will only cause you to

feel self-conscious, turning the diet into an obstruction, a hurdle, rather than something that should slot happily and calmly into your life. Remember your trump card: you'll eat normally again tomorrow. Some days, of course, are tougher than others. Naturally enough, you may find yourself feeling hungrier and less able to fast successfully when celebrating or attending events that revolve around food.

If you know that you have a social event in the diary, fast the day before or the day after. The flexibility of the plan explicitly means – in fact, it demands – that you still go to that wedding, birthday, anniversary dinner, christening, bar mitzvah, supper date, posh restaurant. Take a break for Christmas, Easter, Thanksgiving, Diwali. Yes, you may well put on a little weight, but this is a life, not a life sentence. You can always deviate, eat chips and dips and things on sticks, and then revert to more challenging fasting once the party's over.

What if I'm currently obese?

Clinical trials have concluded that Intermittent Fasting is a sustainable – indeed, one of the most effective – ways for obese individuals to lose weight and keep it off; the larger you are, the greater your initial weight loss is likely to be. If you are obese it's likely that, for whatever reason, traditional restrictive diets have failed for you. The Fast Diet is different because of its flexibility, its war on guilt, and its express approval of 'pleasure foods' on non-fast

days. Studies done by Dr Michelle Harvie and Professor Tony Howell, cited above, have shown that most overweight women are able to adapt to calorie restricting two days a week and lose significant amounts of fat, even those who have had long-term weight issues. As with any underlying medical condition, we recommend that you fast under supervision.

Should I add a third day if I want to see accelerated results?

As Michael wrote earlier in this book, there is good scientific evidence from trials run by Dr Krista Varady and her team at the University of Illinois in Chicago of benefits from more rigorous Intermittent Fasting. They have done a number of carefully controlled studies where volunteers have tried Alternate Day Fasting (ADF). This form of Intermittent Fasting entails cutting calories every other day – a 500 calorie allowance for women, 600 for men. Most volunteers who took part in these studies lost significant amounts of weight, mainly as fat, and saw marked improvements in their biomarkers, including cholesterol.

I'm already slim enough, but would like to enjoy the health benefits of Intermittent Fasting. Is that possible?

If you are already at a reasonable, happy weight, you can still fast effectively, but consider adapting your consumption on non-fast days to encompass more calorie-dense foods. The main researchers we talked to in

this field are all slim and they still fast. With practice, you will discover an amicable balance between fasting and feeding which keeps your weight in the prescribed range. Fast once a week, rather than twice a week. There have been no specific studies to illuminate the effects of doing this, but use your common sense and watch the scales; don't slide. As mentioned above, if you are already extremely lean or suffering from an eating disorder, fasting of any description is not advised. If in doubt, see your GP.

Is it too late to start?

On the contrary, there's no time to lose. The Fast Diet is likely to prolong your life. It will moderate your appetite and help you lose weight. Its effects are quickly felt, often within a week of starting your simple bi-weekly mini fasts. It all points to a healthier, leaner, longer old age, fewer doctors' appointments, more energy, greater resistance to disease. Our advice? Start yesterday.

How long should I continue?

Interestingly, the Fast Diet's on/off eating scheme looks a lot like the approach of many naturally slim people. Some days they'll pick, other days they'll tuck into treats. In the long run, this is how the Fast Diet goes. As you settle into the routine, you'll naturally moderate your calorie intake on fast days and feed days, until the process is innate. When you reach your target weight, you can change the

frequency of your fast. Play with it. But don't drift; stay alert. Your aim is a permanent life change, not a blip, not a fad, not a dinner-party chat. This is a long-distance route to sustained weight loss. Accept that it is something you will do, in a form that suits you, indefinitely. For as long as life.

The future of fasting: where next?

Fasting, as we mentioned at the beginning of the book, has been practised for many thousands of years and yet science is only just starting to catch up. The first evidence of the long-term benefits of calorie restriction were found just over 80 years ago, when nutritionists working with rats at Cornell University in the US discovered that if you severely restrict the amount they eat, they live longer. Much longer.

Since then, the evidence has continued to mount that animals not only live longer, healthier lives if they are calorie-restricted, they also do so if they are intermittently starved. In recent years the research has moved on from rodents to humans and we are seeing the same patterns of improvement.

So where do we go from here? Professor Valter Longo, who has done so much pioneering work with IGF-1, is running a number of human trials in conjunction with colleagues at the University of Southern California,

looking at the impact of fasting on cancer. They have already demonstrated that fasting will cut your risk of developing cancer; now they want to see if fasting will also improve the efficacy of chemotherapy and radiotherapy.

Dr Michelle Harvie and Professor Tony Howell, who work at the Genesis Breast Cancer Prevention Centre in Manchester, have done a great deal of fascinating work developing and testing different forms of two-day intermittent energy restriction. In this book we have quoted a couple of their studies – involving hundreds of female volunteers – which have shown that people can lose weight just as effectively by calorie restricting on an intermittent basis as by calorie restricting every day.

They are planning further studies, comparing what they call 'The 2-Day Diet' with standard dieting. These studies will undoubtedly add to our understanding of how well people are able to tolerate different patterns of eating in the long run.

Professor Mark Mattson of the National Institute on Aging in Baltimore is adding all the time to the dozens of research papers he has already published on the effects of fasting and Intermittent Fasting on the brain. We are particularly interested to see the outcome of some of his current studies, which include looking further into what happens to the brains of volunteers when put on an Intermittent Fasting regime.

In addition, his team is looking at drug therapies, as they know that despite the benefits, many people may

not want to fast. So they are, for example, investigating a drug called Byetta, used for the treatment of diabetes, but which also seems to activate the production of BDNF (brain-derived neurotrophic factor). This in turn, as we've seen, seems to protect the brain against the ravages of ageing. The hope is that Byetta or a related drug will, if not prevent dementia, at least slow its progression significantly.

Intermittent Fasting has, until now, been one of the best-kept secrets in science. We look forward, with a great deal of personal interest, to seeing how this particular story unfolds.