Eat, sleep and exercise at the right times to prevent or reverse type 2 diabetes

THE CIRCADIAN DIABETES CODE

'Satchin Panda's plan is based on real science, and it gets results' – *MICHAEL MOSLEY*

DR SATCHIN PANDA

World expert on circadian rhythms and author of the bestseller, *The Circadian Code*

THE CIRCADIAN DIABETES CODE

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The Circadian Code

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DR SATCHIN PANDA

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To my mother, Geetanjali

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ACKNOWLEDGEMENTS

In 2015, when we published our first human study showing that the average person eats for 15 hours or longer each day, and that reducing this eating interval to 10 hours can promote weight loss, improve sleep, and increase the sense of energy, I received a pleasant surprise. Dr Eric Topol of the neighbouring Scripps Research Translational Institute tweeted our study findings. Dr Topol is a world-renowned cardiologist who immediately saw the potential of our research on time-restricted eating, which is now more commonly known as intermittent fasting, or IF.

We assumed right away that what was good for weight loss would be highly effective in reducing the risk for diabetes and heart disease. It seems the public was on the same page. Soon thereafter, I fielded calls from patients and doctors asking for advice on how to implement IF for weight loss and diabetes management. But we needed more data from clinical studies overseen by doctors. Within weeks, Dr Julie Wei-Shatzel started prescribing a 10-hour IF for her patients with diabetes or prediabetes along with the typical medications. After a few months, she informed me that her patients were making progress in managing their blood glucose and in many cases reducing their medications. Those early results from a doctor encouraged me to start collaborating with researchers working in different universities around the world to test the impact of IF on people at high risk for developing diabetes, people with prediabetes, or those with diabetes.

About a year later, in 2016, I was lucky enough to have Dr Emily Manoogian, a postdoc trainee, join my lab. She already had a PhD in circadian rhythm research and was eager to lead clinical human research in my group. I am immensely thankful for my collaborators who showed early curiosity about IF and took a big risk in trying out a new idea to manage diabetes. They include Dr Pam Taub, Dr Tinh-Hai Collet, Dr

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Our pilot study on the impact of a 10-hour IF on metabolic syndrome started in collaboration with Dr Pam Taub at the University of California, San Diego. In 2018, after our first metabolic syndrome patient completed his 12-week IF programme, Dr Taub was ecstatic about the results. The patient had reduced his blood sugar and blood pressure to normal levels and had lost enough weight from his belly to have reduced his waist circumference by 5 centimetres. I was happy, but I was puzzled. Dr Taub is a famous preventive cardiologist, and she treats dozens of patients with metabolic syndrome every week. Many of her heart patients are also diabetic. I thought doctors like her were curing people with drugs, but she told me that her typical patients were not seeing much benefit from their medications, or when they did see some benefits, they also complained about adverse side effects. But the patient who did IF saw multiple benefits and had no complaints. In fact, he promised to continue his IF as a new lifestyle. The same story was repeated again and again with Dr Taub's study and in the studies of other collaborators. This is when I knew that we had come across something special.

The decision to write this book came quite abruptly. In 2018, I received a Pioneer funding award from the Robert Wood Johnson Foundation (RWJF) to advance the knowledge of circadian rhythms and IF among clinicians and basic scientists by facilitating their research through the myCircadianClock app. I was attending a workshop related to science communication to nurture a culture of health at the RWJF campus in Princeton, New Jersey. By the end of the conference, I was jazzed up about communicating our latest findings. And that is when my friend Pam Liflander drove down from Connecticut to have a chat

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over dinner. We could not have the dinner meeting at a more opportune time. She convinced me that I should write this book and she would help me, just as she had done so well with my first book, *The Circadian Code.*

The outline for the book took shape during many dinner-table discussions with my family. My wife, Smita, and daughter, Sneha, would listen patiently to my scientific explanation and nudge me towards a simple clarification. Every once in a while, when my curious mother would visit me, she would also join the discussion by sharing her own journey with IF to reverse her diabetes. My family's patience with my long hours in the lab and frequent travels, and their constant support, has been priceless.

My editor, Donna Loffredo, and her team at Penguin Random House have been a pleasure to work with. My agent, Carol Mann, played an integral role in getting the project off the ground.

I am thankful to the Salk Institute for Biological Studies, where scientific excellence, symbiosis, and a strong drive to make foundational breakthroughs that can leave a lasting impact on the planet have been fuelling my research. The work of the founder, Dr Jonas Salk, is specifically inspiring for me: his development of the polio vaccine proves the powerful message that prevention is the best cure. The Salk Institute has given me unwavering support to do many unconventional experiments. My principal collaborators and scientific colleagues at Salk include Dr Ron Evans and Dr Marc Montminy, who introduced me to the molecular connections between circadian rhythms and nutrition metabolism, which form the foundation for understanding how nurturing your circadian rhythm is central to diabetes prevention and management. Dr Reuben Shaw, Dr Alan Saghatelian, and Dr Joe Ecker have helped me with my circadian rhythm research in understanding how gene activities at different times of the day influence metabolism.

Outside of Salk, my collaborations and discussions with leaders in the area of intermittent fasting, circadian rhythm, metabolism, and diabetes include Dr Dan Drucker, Dr Mark Mattson, Dr Johan Auwerx, Dr Valter Longo, Dr Eric Verdin, and Dr Joe Takahashi, all of whom

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helped integrate the science behind Time-Restricted Eating (TRE) and circadian rhythm with the science of diabetes.

I am truly fortunate to work with a great group of students and trainees. Their hard work and long hours in the lab to break their own circadian code made it possible to test many of the ideas described in this book. I am especially thankful to Hiep Le, Dr Christopher Vollmers, Dr Megumi Hatori, Dr Shubhroz Gill, Dr Amandine Chaix, Dr Amir Zarrinpar, Dr Ludovic Mure, Dr Luciano DiTacchio, Terry Lin, and Dr Shaunak Deota.

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Finally, through the myCircadianClock.org website and research app, thousands of people have come to learn about their own circadian rhythms and have shared their positive health changes achieved by following the lessons presented in this book. I am grateful to all of them.

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INTRODUCTION

If you or a loved one has recently been diagnosed with prediabetes or diabetes, you are not alone. According to Diabetes UK, more than 4.9 million people in the UK have diabetes, 90 per cent of whom have Type 2 diabetes. More shocking is the statistic that an estimated seven million people in the UK have prediabetes. Just by reading this book, you are taking a very important step forwards in managing your health.

Having a doctor tell you that you have prediabetes, or Type 2 diabetes is almost like running a temperature greater than 38°C. It's a sign that some aspect of your health is off balance, and if you don't pay attention, it can become much worse, potentially leading to life-threatening complications. Not only is diabetes linked to other chronic health conditions such as obesity, heart disease, and Alzheimer's disease, but it is also one of the most devastating underlying conditions related to intensifying infectious diseases such as COVID-19.

Yet we know that even with diabetes, some days we feel better than other days. When we stop to think about it, those better days are typically the ones when we have slept well, ate nutritious foods, and even exercised. In the very same way, with these very same tools, anyone can learn how to control their diabetes, and possibly even reverse a diagnosis.

I'm on the forefront of circadian rhythm research, which is the science of our biological clocks. In my first book, *The Circadian Code,* I showed readers all over the world how every cell in the human body has a clock and keeps a schedule of when it is the optimal time for it to function. My research has fuelled a whole new way of eating, which I call *time-restricted eating* (TRE), and is more commonly known as *intermittent fasting* (IF). Basically, my research shows that when it comes to weight loss, it's not only what you eat that makes a difference. To

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lose weight, it's equally important to make good decisions about *when* you eat. My protocol not only works for weight loss; it also optimises every cell in the body, including those that monitor blood glucose. If we nurture our circadian rhythm, it in turn nurtures our health. If you can control when you eat, you can reverse your prediabetes, manage your long-term or recently diagnosed Type 2 diabetes, and lose weight along the way. By doing so, you can also enhance every other aspect of your health.

How do I know all this? Just ask my mother.

MEET MRS PANDA

I am lucky enough not to have prediabetes or diabetes—yet. However, I know that I have a high risk for developing diabetes and heart disease just by being from South Asia. For the past eight years, I have adopted an intermittent fasting lifestyle in which I try to eat within a fixed 10-hour window most days. This has helped me shed some extra weight. But the best results from intermittent fasting have been with my mother.

Seven years ago, my mother noticed the blood sugar numbers on her annual physical exams were creeping up. Over the next two years, her exams showed that her blood sugar was continuing to rise; in other words, she was approaching a diabetic state. Even though her doctor wasn't really worried, she panicked because she knows the damage diabetes can cause. She had seen too many friends and relatives who ignored the early signs of the disease, and even after taking daily medications for years, they slowly developed heart disease, kidney disease, blindness, and even dementia. My mother was also less than thrilled about the idea of living with diabetes, having to carefully monitor what she ate at every single meal.

When she first told me the news, we talked about her daily diet and exercise routine, because it is well known that the foods you eat and the amount you exercise can influence your blood sugar levels. Yet even though she was already doing everything right, the results weren't adding

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up. As a vegetarian, she would eat more than the recommended portions of fruits and vegetables every day, and she would take a daily walk in the evenings. She was also fasting at least once a week for religious reasons, while on other days she ate dinner by 8:00 p.m. But I noticed occasionally, at least two or three times a week, she would have a cup of tea with sugar and milk around 9:00 p.m. if she visited any of our relatives; it was difficult for her to decline a late-night snack.

I knew from my previous research that by eliminating this occasional and seemingly benign late-night snacking, she may be able to see some improvements in her blood glucose. When I first told her this, she laughed at me. Besides, her doctor and other health professionals could not be convinced that these small late-night meals were the culprit, pushing her towards diabetes.

A few months later I convinced her to visit me in the United States. When she lived with me for the next several months, she adopted my stricter rule of no food after 6:00 p.m. In the morning, she ate her breakfast around 9:00 a.m. That pattern created a daily eating window of 9 hours. Over the next several weeks, she told me that she had never felt better. And when she returned to India and continued eating this way, her blood sugar levels declined to below a prediabetic level. After five months, her fasting blood glucose was hovering near a healthy range. Best of all, for the past five years, she's been able to stay healthy and off all medications—just by keeping to the protocol.

Since then, I have repeated this experiment in more than a dozen clinical trials. My group has worked not only with patients who have prediabetes but also those suffering from high cholesterol and high blood pressure. We always find that those who can follow a 10-hour IF can substantially improve their health.

LET YOUR CLOCK CONTROL YOUR BLOOD SUGAR

Now it's time to try this experiment together. You can be in complete control of your blood sugar by living in alignment with your circadian

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rhythm. Not only is it easy, but also every aspect of your health will get better. In this book, you'll learn when to eat, when to exercise, when to sleep, when to work, and when to take your medications, if necessary. If this programme sounds simple, that's because it is.

Your doctor may tell you to eat less, exercise more, and stay away from sugar and carbohydrates. There is sufficient research to substantiate these recommendations. However, the problem is in the compliance. Experts know that to follow these recommendations, you have to count calories for every meal you eat, track and avoid the foods that are known to raise your blood sugar, and count how many miles you walk or run. If you can do this, great; many people with prediabetes or diabetes begin this type of programme and see some benefits within a month or two. But more often than not, the regimen becomes too difficult to sustain for a long time. Even though these are good habits to form, they are too arduous. This is where my research on circadian rhythm and time-restricted eating is opening new avenues for treating diabetes.

Research on circadian rhythm has shown that blood glucose regulation is more complex than we had known before. When we eat, when we exercise, and how much or when we sleep have a big impact on our blood glucose. By following this programme, you may achieve your goals without counting a single calorie.

In addition, you'll learn that IF has numerous other benefits on various organ systems, immune systems, and the brain, including weight loss. When it is practised over a few months, you can retrain your liver and fat tissues to break down unwanted fat and cholesterol. In preclinical studies, we have found a clear sign of a reduction in risk for heart disease. These findings are very important, because someone with diabetes has the same risk for heart disease or heart attack as a nondiabetic person who has already had one heart attack. We also have found that IF improves kidney function. One common diabetes complication is chronic kidney disease and kidney failure. And by losing weight and enhancing immunity, you are doing the two best things possible for avoiding COVID-19 complications.

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HOW THIS BOOK WORKS

During the last few years, as IF became popular in the mainstream media, many people who had heard me on a podcast, followed me on Twitter, or read *The Circadian Code* would try IF and contact me with their success stories or to seek advice on how to implement IF in their own life. As I am not a medical practioner, I would always advise them to consult with their GP regarding my suggestions. Slowly I realised that my GP colleagues are busy writing prescriptions, and even if they wanted to help their patients establish an optimum lifestyle to manage disease, either they didn't have enough time or weren't familiar with the nascent science of circadian rhythm. But it also became apparent that every patient needs a lot of guidance and information between their visits to doctors' offices on how to live a healthy life. That is why I decided to write this book.

This book serves three purposes. It is a source of essential knowledge about the new science of circadian rhythm and how it relates to controlling blood sugar. It provides an integrated practice for both IF and optimising your entire circadian rhythm within your lifestyle. And it shares the experiences of all different kinds of people who practise IF and relates how they tackled the challenges to ultimately improve their diabetes. The beauty of circadian rhythm and IF is that anyone, irrespective of age, sex, ethnicity, or income level, can implement it in their own life. I hope you will share this knowledge with your family and community so that we can create and sustain a culture of (circadian) health.

In Part I, you will learn about both the basics of circadian science and the latest research regarding diabetes and what I call "the sinister friends of diabetes", heart disease and obesity. You will be able to assess your current risk for developing diabetes, and what you need to focus on if your doctor has already given you this diagnosis. You will also see how living out of alignment with your natural circadian rhythm may be negatively impacting your risk factors or the way you are managing your diabetes right now.

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In Part II, you will learn how to get back into better alignment. You will discover how to be successful with IF, which is a critical tool for better regulating your blood sugar levels. You will not only determine when is the best time to eat but also what you should be eating. As you probably know, exercise and good sleep are also critical. Now you will learn when is the best time to exercise and which types of exercise are best for managing diabetes. Lastly, you will learn more about the importance of sleep and how to limit light exposure at night: each play an important role in managing diabetes.

In Part III, you will first learn how to understand exactly what your doctor is trying to tell you during your checkups. You will then learn how to make the most of every appointment with your GP and how to introduce him or her to circadian science so you can better manage your diabetes. Then, you will put everything you've learned to the test, and participate in a 12-week health challenge that will get you the results you are looking for. It is hoped you'll believe as I do that living in alignment with your circadian rhythms is the easiest way to maintain good health over the long run.

What do you have to lose? Let's get started.

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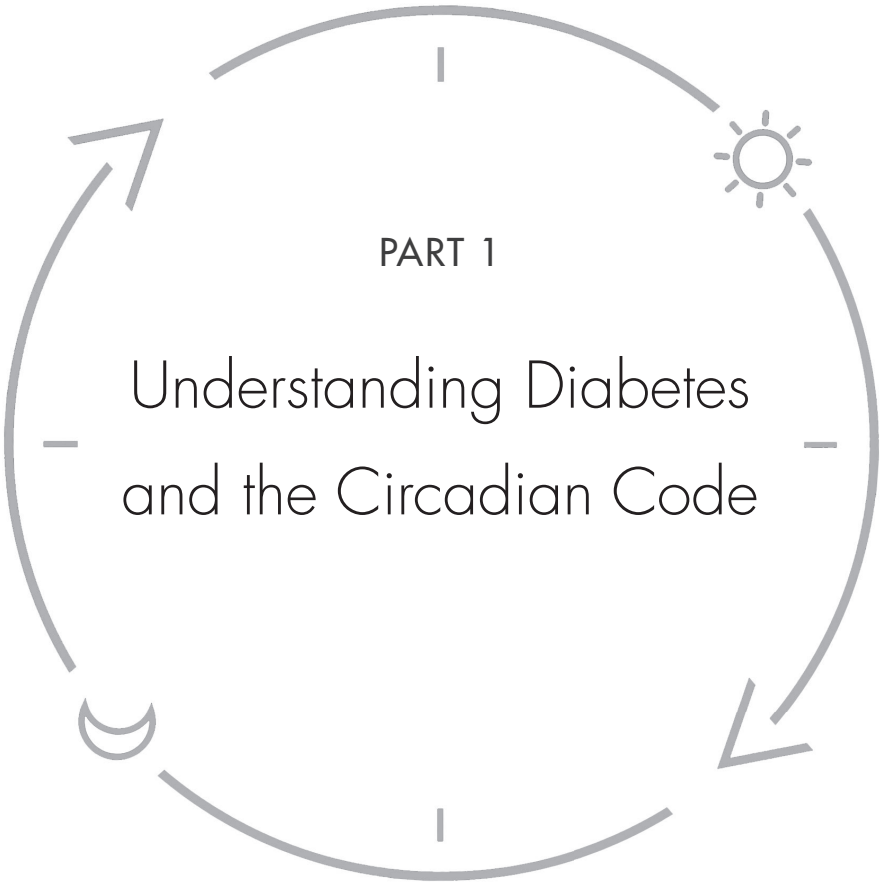

PART 1

Understanding Diabetes and the Circadian Code

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CHAPTER 1

Diabetes Explained

The diabetes discussion begins and ends with food. Our meals contain one or more of three *macronutrients:* carbohydrates, proteins, and fats. As soon as we eat, the digestive juices in our gut break these macronutrients into the smallest molecules so that our cells, all over our body, can use them. Fats are broken down to simpler fatty-acid molecules; proteins are broken down to amino acids; and carbohydrates are ultimately broken down to sugars such as glucose. These fatty acids, amino acids, and glucose molecules are released into the bloodstream, where they travel to the different organs to power our cells, repair them, and make new cells.

For most of us, carbohydrates are at the heart of each of our meals: cereal for breakfast, a sandwich for lunch, pasta or rice with dinner. So, it is not surprising that out of the three key macronutrients, we have an abundance of sugar/glucose molecules floating in our bloodstream. Sometimes, our meals are so ladened with sugar that we couldn't possibly use all the sugar that we eat immediately. So, just like we store petrol in our car's petrol tank, the body has created a way to store glucose and the other macronutrients we eat and use them judiciously between meals. For instance, a glass of juice or fizzy drink typically has 39 grams of sugar, and if all of it entered our blood without getting absorbed in our cells and organs, our blood sugar would rise to a life-threatening level. Therefore, within minutes of eating, hormones sense the arrival of carbohydrates and prepare the liver, muscles, and fat tissues to store most of the carbohydrates or sugar we just ate. The sugar is stored in the form of

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glycogen and, to some extent, body fat. Fatty acids are stored as fat, and amino acids are stored as proteins.

Almost every cell in our body and brain loves glucose as a source of energy. In fact, our body constantly needs energy—much more often than the number of times a day we eat. So, just as we have a process for storing nutrients, our body has different mechanisms to sense our level of physical and mental activity, and releases just enough stored energy to support it. Between meals, our body has to predict our energy demand and accurately release just the right amount of glucose from the stored glycogen. When the glycogen store gets low, the body can then break down stored fat to supply energy to many cells. Our body can also use some stored proteins and convert them to glucose.

These two mechanisms—how we both store and release glucose—are at the heart of controlling how much sugar is in our bloodstream at any given time. When we can maintain this delicate balance, we have health. But when blood glucose levels are too high after a meal, or the body releases too much glucose from storage on demand, we have problems.

ONLY 5 GRAMS OF SUGAR

A healthy adult body is designed to have between 4 and 6 grams of sugar in the blood—just one teaspoon—no matter if you have just finished a heavy meal, are in the middle of a marathon run, are deep asleep, or have not eaten for a day. Just like a fish in a fish tank, where even the slightest change in water quality can make the fish sick, every cell in our body performs best within a narrow range of blood sugar. When the exquisite mechanisms that sense and regulate our blood glucose levels go even slightly off, there is a grave danger that brain and body cannot perform well. If your blood sugar falls below 3.5 grams, you may notice that your vision begins to blur, or you feel dizzy. This is referred to as *hypoglycaemia*.

Since we almost always eat more carbohydrates/sugars than we need to support a healthy blood sugar level, and our body has plenty of stored carbohydrates (glycogen) and alternate sources of glucose (protein), most

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problems with blood glucose regulation result in too much sugar in our blood. If your blood sugar rises above 6 grams and stays there for long periods of time, you will develop diabetes.

But let's not get ahead of ourselves. First, let's talk about what happens to your health when things go right. When your body is working optimally, it can regulate blood glucose levels precisely through a variety of players that mostly fall into four major groups: energy sensors, hormones, hormone sensors, and gates that allow glucose to pass through the cells. The most important of these are the hormones and their sensors. And the most important hormone is *insulin,* which is produced from a few thousand cells in our pancreas. Insulin's "hormone sensor", or *receptor,* is present in almost every cell in our body.

When we eat, digested carbohydrates from our food rush into the blood and our blood glucose level quickly goes up—within minutes. This blood glucose increase is sensed by the pancreas, which releases insulin. Insulin is responsible for opening the door on every cell to let in the glucose so it can be used for energy. It's like the electronic signal from your garage door opener that connects to a receiver (the insulin receptor) to open the garage door so you can drive your car (glucose) into the garage (a cell). The same insulin code can open nearly all the doors in all the cells, including the liver, muscle, and fat cells. This is important because these cells absorb and store most of our excess carbs so that your blood glucose level comes back to normal within an hour or two after a meal.

You may need to release some glucose from storage to power your body and brain. Usually this happens several hours after a meal, when the easiest available glucose begins to decline, or if your body suddenly needs extra energy, such as when you are running or doing strenuous work. Our brain alone consumes up to 5 grams of glucose every hour. If an average-size adult is walking briskly (4 miles/hour), they are using an energy equivalent of 1 gram of glucose every minute. These conditions require releasing some glucose from the stores, or if the store is running low, making glucose by breaking down protein. Just like insulin signals the glucose to enter cells for storage, a separate set of hormones that sense hunger or stress signal

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the storage tank to release just enough glucose to meet the energy need without letting the blood glucose level rise too high.

Now let's look at what happens in the hours between meals. After you've eaten there is a changing of the guard—the hunger hormones shut down so that the flow of glucose from the liver is stopped. You will be accessing the glucose from the food you just ate. The eating hormone, which is insulin, turns on so that the rising blood glucose from the meal you ate is now sent to the liver, muscle, and fat to avoid blood glucose rising too high. The cycle continues every time you eat.

YOU ARE NOT ALONE

Almost one in three adults in the United States and almost one in four adults around the world have either diabetes, elevated blood glucose, or are at risk of developing elevated blood glucose.[1] The stats for the UK are similar. That means you are not alone. It is very likely that someone you know (your parents, siblings, children, or a close friend) has this problem. So, when you master the techniques to bring your health under control, you can also help your loved ones reach their full physical, mental, and emotional potential.

THERE ARE DIFFERENT TYPES OF DIABETES

When blood sugar cannot be controlled, we develop one of several forms of diabetes. It is important to know which type of diabetes you have been diagnosed with so that you can accurately monitor it and treat it more effectively. Your body may not be producing enough insulin, or your insulin sensors/receptors may have become defective. Or, there may be certain conditions in which an imbalance of other hormones may affect your body's ability to regulate glucose. Based on these causes, there are at

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least five different types of diabetes known today. All of the suggestions in this book may apply to you, regardless of what form of diabetes you are dealing with. The only difference is the way your health improves.

TYPE 1 DIABETES. In most instances, Type 1 diabetes develops early in childhood, but for some people it can happen later in life. The cause of Type 1 diabetes is believed to have nothing to do with diet or lifestyle. Instead, it is a true autoimmune disease resulting in insulin deficiency. The immune system gets confused and thinks the insulin-producing cells in the pancreas are foreign invaders. The body starts attacking and destroying these precious cells, and the result is that the pancreas never produces enough insulin to move glucose into the cells where it is needed. Symptoms of Type 1 diabetes include frequent urination, slow-healing cuts and bruises, extreme thirst, dry mouth, fatigue, weakness, and increased appetite combined with weight loss.

TYPE 2 DIABETES. This form can develop at any age, although it is most prevalent in adulthood. It occurs when the body doesn't use insulin properly, and the pancreas makes extra insulin to compensate, but is unable to keep up with the demand. Symptoms of Type 2 diabetes include frequent urination, extreme thirst and hunger, slow-healing cuts and bruises, drowsiness, low energy, pain or numbness in the arms and legs, vision changes, sweet-smelling breath, and unexplained nausea or vomiting.

GESTATIONAL DIABETES. Usually, this is a temporary form of diabetes that occurs during the second or third trimester of pregnancy. The body does not produce adequate amounts of insulin. Its symptoms include extreme thirst, frequent urination, fatigue, nausea, vaginal and bladder infections, vision changes, and slow-healing cuts and bruises.

DIABETES DUE TO OTHER CAUSES. Some forms of diabetes are specifically related to other health issues. These conditions can include diseases of the pancreas, such as cystic fibrosis or pancreatitis, and drug/chemical-induced diabetes, which can occur if someone is taking glucocorticoids, is being treated for HIV/AIDS, or has had an organ transplant. It occurs because the pancreas stops producing normal amounts of insulin, causing insulin deficiency and the same symptoms as Type 1 diabetes.

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PREDIABETES. According to the Centers for Disease Control and Prevention (CDC), close to 88 million American adults—more than one in three—have prediabetes.[2] In the UK some seven million people have prediabetes, according to Diabetes UK. Of those with prediabetes, 90 per cent don't know they have the condition because there are no serious symptoms. It occurs when blood glucose levels are higher than normal (>100 mg/dL), but not high enough to be classified as full-blown diabetes (<126 mg/dL). If left untreated, prediabetes can progress to Type 2 diabetes. However, if treated, it can completely resolve itself. If you've received this diagnosis, you are in the best position to improve your health and completely reverse prediabetes by using this programme and making healthy changes to the way you live right now. These steps include managing your weight, exercising at the right time of day, eating healthier, quitting smoking and, most important, aligning your eating/sleeping cycle to your innate circadian code.

Be sure to ask your doctor what your exact blood sugar test results are when he or she tells you that you have prediabetes; that way, you can track your progress in reversing the trend and attaining better health.

RISK FACTORS TO CONSIDER

Diabetes doesn't come out of nowhere. Take age, which is a significant risk factor. As we get older, every part of our body ages, including the pancreas; an old pancreas may not produce enough insulin. Or the cells become insensitive to insulin, so they do not respond correctly as we get older. We also know that men have a higher incidence of diabetes than women; it's thought that the female sex hormones protect against diabetes to some extent. Having certain genes, and specific combinations of genes, can also predispose someone to diabetes, which is why people of certain ethnicities are at a higher risk for diabetes, independent of one's habits. This means that Asian Americans, Pacific Islanders, African Americans, Latinos, and Native Americans are genetically predisposed to diabetes, regardless of their typical diet or lifestyle.

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Diabetes treatments are personalised to match a person's overall health and what side effects they are likely to experience from diabetes medications. This means that depending on your health, age, sex, weight, and race, you may be treated very differently from someone else in your family. Let's use per centages as a method for comparison. For example, a parent or grandparent in their 70s or 80s who has been living with diabetes for the past 20 years, and who has other health conditions, may be put on a treatment regimen to maintain the blood glucose levels at around 8%, because the medications to lower the blood glucose to 7% or 6% may do more harm, owing to adverse side effects. For someone in their 50s diagnosed with Type 2 diabetes and not having other health complications; the doctor may set a treatment target to bring their blood glucose down to 7%.

Now, if you are diagnosed with a blood glucose level of 6.5%, your older friends may tell you that 6.5% is nothing compared to what they have been struggling with. And if you are diagnosed with prediabetes with a blood glucose of 5.8%, someone else may even tell you to completely ignore your blood report. However, you can't compare your results to those of your relatives. If you ignore your prediabetes or early-stage diabetes, thinking you are not "that bad yet", and you do not make any attempt to change your lifestyle or get on medication, you will end up at a stage of diabetes where you can no longer simply "get back to normal".

HOW MUCH DO YOU WEIGH?

Not everyone who is overweight will develop diabetes. And not everyone with diabetes is overweight. However, weight is an important risk factor that is within our control. As we gain weight, the pancreas doesn't proportionately increase in size, making it less effective at producing enough insulin to support the entire body. What's more, the extra fat cells we acquire with weight gain interfere with insulin function. These two reasons are why weight gain poses an increased risk for diabetes.

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The following chart shows the average height-to-weight ratio that signals an increased risk for developing diabetes.

Height	Your Risk for Diabetes Increases If You Weigh More Than
147 cm	54 kg
150 cm	56 kg
152 cm	58 kg
155 cm	60 kg
157 cm	62 kg
160 cm	64 kg
162 cm	66 kg
165 cm	68 kg
167 cm	70 kg
170 cm	72 kg
172 cm	74 kg
175 cm	76 kg
178 cm	78 kg
180 cm	81 kg
182 cm	83 kg
185 cm	86 kg
188 cm	88 kg
190 cm	91 kg
193 cm	93 kg

SHOULD I GET TESTED FOR DIABETES OR PREDIABETES?

We know that the way we live our lives either increases the risk for diabetes or discourages it. These are the factors we can—and should—control. Many of the following lifestyle habits—such as physical activity, how

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