

The Circadian Diabetes Code

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Consult your physician before initiating any nutrition program, especially if you have been diagnosed with diabetes and are currently taking medications.

Chapter 1 - Diabetes Explained

Food contains 3 macronutrients that are digested in the stomach and then sent through the small intestine to be absorbed into the blood, which then carries them to cells throughout the body:

Carbohydrates > sugars (glucose) > glycogen (glucose) storage
Proteins > amino acids > protein storage
Fats > fatty acids + glycerol > fat storage

Excess macronutrients from meals are stored throughout the body for later use between meals.

There are two mechanisms at the heart of controlling how much sugar is in our bloodstream at any given time : how we STORE glucose within minutes of eating and how we RELEASE glucose in between that meal/storage event. When we maintain this delicate balance we have health.

Regulation of blood sugar levels is accomplished through four main ways:

Energy sensors
Hormones - insulin
Hormone sensors - receptors in the cells
Gates

When we eat:

Carb ingestion > rise in blood glucose > pancreas releases insulin > insulin opens the “gate” in almost all cells (liver, muscle, fat, other) > glucose is stored in cells > blood sugar levels in blood reduce to “normal”.

In between meals:

Other hormones sensing hunger/stress signal glucose stores to release glucose into the bloodstream, or
Signal glucose generation (gluconeogenesis) from other substrates in the bloodstream or in storage - lactate, amino acids, glycerol.

Diabetes is the inability of the body to control blood sugar and have varied causations. The body can be unable to produce enough insulin, the insulin sensors/receptors at the cells may have

become defective or there may be an imbalance of other hormones. Based on these causes there are at least five different types of diabetes known today.

5 Types of Diabetes

Type 1 Diabetes - Can develop at any time but most often earlier in life and has nothing to do with diet or lifestyle. It is a true auto-immune disease resulting in insulin-deficiency. The immune system attacks the insulin-producing cells of the pancreas and destroys them, therefore high chronic blood sugar.

Type 2 Diabetes - Can develop at any time but is most prevalent in adulthood. It occurs when the body doesn't use insulin properly and the pancreas makes extra insulin to compensate but never produces enough, therefore high chronic blood sugar. Type 2, if left untreated, can progress to insulin-dependent Type 2 diabetes.

Gestational Diabetes - Usually a temporary condition occurring during the second or third trimester of pregnancy. During this time, the pancreas simply does not produce enough insulin.

Diabetes/Other Causes - Diabetes caused by diseases of the pancreas or drug/chemical induced by glucocorticoids, HIV/AIDS treatment, organ transplants.

Prediabetes - Per the CDC, 88 million (1 in 3) American adults have prediabetes. Of these projected prediabetics only 10% are aware they are prediabetic because the initial symptoms are difficult to sense/detect. Prediabetes is defined as blood sugar levels higher than normal (>100 mg (glucose)/ dL (of blood)). Diabetes is defined at <126 mg/dL. Left untreated, prediabetes can progress to diabetes.

If identified, acknowledged and treated it can almost always be **completely resolved without medications** using lifestyle interventions via:

1. Exercise/activity - exercise acts like insulin to move glucose out of the blood and into cells and can contribute to weight loss/maintenance.
2. Nutrition - regulation of blood sugar via meal selection/timing and weight loss/maintenance.
3. Stress Attenuation/Reduction - reduction of circulating stress hormones (cortisol) that contribute to higher blood sugar levels.
4. Sleep - chronically sufficient and rhythmic - to recover and reset from the inputs/stressors of waking hours.
5. Smoking cessation

Diabetes Risk Factors

Age - as we age the pancreas may produce less insulin and/or the cells become insensitive to insulin

Gender - men are at higher risk

Genetics - genes and specific combinations of genes can predispose to diabetes (ex., ethnicity)

Your diabetes treatment protocol should be personalized depending on your overall health, age, sex, weight and race and the totality of all factors that might cause side effects from your diabetes medications. Ignoring pre-diabetes will eventually lead to a level of diabetes that can not be controlled by lifestyle modifications and even with medication you will eventually progress to any number of diabetes-related conditions and other negative health outcomes.

Not everyone who is overweight will develop diabetes and not everyone with diabetes is overweight, however, it is an important risk factor. As we gain weight, the pancreas does not increase proportionately in size, and therefore it can not produce enough insulin to support the whole body. Also, the extra fat cells interfere with insulin function,

Self-Screen for Diabetes - page 11

> If you answer yes to 5 or more of the questions you should be medically screened for diabetes. Regardless, everyone should have a complete physical with a blood panel (that can address a diabetes screen) every year to accumulate data over time. The more you know, and the earlier you know it, the better you can pivot your lifestyle to address any potential issues.

Diabetes is the beginning of the body's degeneration and may present and develop with little or no symptoms that can be "sensed". Diabetes eventually leads to other insidious negative health conditions. Living day to day with the status of high blood sugar can and will eventually cause other organs to weaken and show signs of dysfunction. As parts of the whole body system start to decline, others will follow. Diabetes is the engine that drives us, eventually, through a slow decline to disease after disease, medication stacked on medication, to a life that is devoid of physical freedom, clear cognition and joy. A slow death that others will experience with you. And sadly, **one that can almost always be prevented or mostly reversed.**

In a chronically high blood sugar environment, blood vessels weaken, leak, stretch, or become clogged resulting in restricted blood flow to all cells. Nerve endings can become more or less sensitive or even degenerate resulting in malfunction of organs and cells and can result in tingling and burning in the skin, especially the hands and feet. Muscles and joints also weaken over time in a high blood glucose environment.

Testing for Diabetes - page 14

1. Fasting Blood Glucose (FBG)
2. Oral Glucose Tolerance Test/Postprandial (post eating) Glucose (PG)
3. Random Test
4. Hemoglobin A1C

Diabetes and Other Diseases - Metabolic Syndrome

Diabetes is just one symptom of a dysfunctional metabolic system. Metabolism is the chemical reactions that occur when the body utilizes the nutrients we eat to produce energy, to build, repair and discard cells and eliminate waste. When metabolism is awry, digestion and utilization is altered, usually resulting in weight gain, which can then affect our blood cholesterol and consequently our health in the form of: **obesity, diabetes, and heart disease.** These three

conditions can appear at different times, but each causes the other two to increase in severity. As the totality of the symptoms accumulate, this affects the normal functioning of the body in total and is referred to as **metabolic syndrome**.

Per the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults, metabolic syndrome is defined as the presence of **any three of the five** following traits:

1. Abdominal obesity
2. High blood pressure
3. Laboratory abnormalities of triglycerides (a type of fat in the blood)
4. Low levels of high-density lipoprotein-cholesterol (HDL-C) levels
5. Fasting blood glucose of 126 mg (of blood glucose)/dL (per deciliter of blood) or higher.

“Diabetes is a warning, a symptom, and a crystal ball for viewing your future physical, psychological, and emotional health. Diabetes makes life miserable, renders you less productive, and provides a less enjoyable and shorter life”

Other Conditions Via Diabetes and Metabolic Syndrome - page 16

1. Heart Disease and Stroke
2. Obesity
3. Blindness
4. Cancer
5. Dementia/Alzheimer's Disease
6. Dental Disease
7. Depression
8. Erectile Dysfunction
9. Foot Ulcers
10. Gastroparesis
11. Infection and Inflammation
12. Kidney Disease
13. Muscle and Joint Pain
14. Skin Disorders
15. Women's Reproductive Health

> All of these conditions and diseases can be driven by diabetes and metabolic syndrome - and all can be risk-reduced or averted with lifestyle changes. All of this can be “cured” with exercise, nutrition and daily recovery. **Doing what everyone else is doing isn't working for you.** They're doing it wrong - almost all of them - and it isn't working for them either.

This book is about aligning the way you live with your body's intended natural rhythm - your circadian code. Your body juggles many tasks by having them occur at distinct times of the day - your circadian rhythm - much like you juggle many different tasks of the day by organizing them

in a calendar. One of these tasks is keeping your blood glucose level within a healthy range during a 24-hour cycle.

Your “lifestyle” is the what, when and how much you eat, sleep, move and connect on a daily basis. The “timing” of this lifestyle is crucial and in many respects - the key and the foundation to optimum health.

Chapter 2 - Broken Clocks: How Circadian Rhythms Get Out of Sync

Every task your body performs is guided by a precisely timed daily drive. Everything the body does is an intricate dance within and among the various organs, coordinated to the smallest cells that make up every body part. Every cell contains the same genome (DNA) of genetic information and the individual segments that carry this genetic information are called genes. The health of our organs, and whether we develop a particular illness, depends on which genes we have and how they are **expressed**: whether a specific gene is turned on or off, or it is a normal gene or a mutant.

Initial research led scientists to understand that inside every human cell is one gene that regulates a circadian clock, which is referred to as a period gene (PER gene). This PER gene sends instructions to create a single protein (PER protein), and its levels rise and fall every 24 hours, informing the cell what time it is. Once enough PER protein is made for the day, the gene turns off. The amount of time it takes to complete the rise and fall of this PER protein is 24 hours - **the master circadian clock**. We also have over a dozen additional clock genes inside our cells.

Via research on mice gene mutations, current thought suggests that the major reason for having a clock within each cell is to tightly control metabolism within a healthy range. If the circadian clock is broken, out of synchronization with other cells/organs, you become at risk for diabetes and metabolic syndrome.

The human body simply can not have all biological functions happening at the same time. Research has proven that up to 90% of all genes can be turned on or off at certain times of the day.

To **optimize** the circadian rhythms and cell function:

1. We must align when we eat with when our cells are ready to accept glucose from the blood (post meal) to help maintain a healthy range of blood sugar.
2. If blood sugar levels stay chronically high, the cells never have the signal to tap into stored fat and glycogen between meals. Eating continuously throughout the day is the main culprit of this phenomenon.

3. Cellular maintenance is circadian and rids the body of reactive oxygen species that contribute to inflammation throughout the body. Cell repair and division is also accomplished in a circadian rhythm - at night, when we are asleep.

Our organs are composed of cells that secrete molecules that other cells use for a variety of reasons.

Messenger molecules

Hormones - tell specific cells to complete a specific task (insulin > accept glucose into the cell)

Neurotransmitter - from the brain. (NPY and AgRP tells us when to feel hungry or full)

Cytokine - modulates our immune reactions. Most rise and fall. If they stay high, the body fights against itself (COVID 19 cytokine storm). If they stay too low, the body is prone to infection.

These molecules are released from organs and the timing of the production and secretion is circadian, which means that every organ has its own clock that runs on a schedule best suited for its function. At the same time, every organ needs to communicate to other organs what it is doing, so they can all synchronize their efforts. In every organ, thousands of genes turn on and off at different times, and in a **synchronized fashion**.

The Master Clock: The SCN

The SCN (suprachiasmatic nucleus) is a small cluster of cells that function as a “master clock” and is strategically located at the hypothalamus, at the center of the base of the brain, which houses the command centers for hunger satiety (fullness after eating), sleep, fluid balance, stress response and more.

In the evening, it tells the pineal gland to secrete the hormone melatonin to transition us to sleep and concurrently instructs the stress center to lower its output of stress hormones and the hunger center to feel less hungry. The SCN tracks the hours as you sleep and then before waking instructs different brain centers to activate to prepare for waking up. At waking, the SCN reverses these tasks, lowering melatonin and increasing stress and hunger hormones.

When the SCN master clock is functioning in rhythm you feel hungry, sleepy and energized at the right time of day and night with sufficient sleep to support recovery.

The SCN aligns itself with the outside world by monitoring the presence or absence of light in our environment, and it shares this information with the other clocks in the brain and body. The SCN anticipates wake time and sleep time based on this information. If you're doing what you're supposed to be doing in accordance with your circadian rhythm all of the organs function perfectly and in harmony.

Optimum health is achieved by aligning our behaviors to the rhythm of the light-dark SCN master clock. Most people in Western society are unaware of this and are out of rhythm all the time - hunger pains when blood sugar levels are sufficient, lethargy in the middle of the day, etc.

Our circadian rhythms carefully align the mechanisms that allow us to digest food, use it, or store and release it for later use. **When the rhythm is thrown off:**

1. The body cannot absorb enough sugar from the blood after we eat as quickly as it should
2. The sugar remains in the blood instead of getting absorbed and processed
3. Sometimes the body also skips the step of burning fat and instead begins to break down protein to produce even more glucose.
4. Also, sometimes the liver forgets to stop burning protein and continues to create glucose from it even when we have just eaten a meal

The body is designed to handle more carbohydrate- and sugar-rich food earlier in the day when we are more active. The protein, fat and complex carbohydrate or fiber-rich food that take longer to digest, provide the more slowly processed energy that is required at night so we don't wake up. Also, nighttime is the time for the body's recycle and repair systems to work more efficiently and these are triggered when there is less available sugar. The **overnight fast** sets the environment up for optimum cell recycle and repair.

Circadian Rhythms and the Three Foundations of Health - page 37

1. **Eating** - The clocks in both the brain and body control hunger, satiety and food choices. Clocks in the digestive system, liver, pancreas, and muscles optimize digestion, absorption, and utilization of nutrients
2. **Physical Activity** - There is an optimal time for daily exercise when we have the most energy and are less susceptible to injury
3. **Sleep** - A circadian clock tells the brain when to sleep, how long to sleep, and informs of the quality of sleep. Restorative sleep balances our mood, attention, and hormones.

Rhythm 1 - Eating

The first rhythm you should pay attention to is **when you eat**. You should eat your first meal between 1-2 hours after you wake up. This will sync your SCN master clock (awakened by daylight) and your liver (activated by eating) to start a day's worth of activity together.

Also, most people eat all through each day. You should ride the "first meal" wave into your 8 to 10 hour feeding window and no longer. The end of the feeding window should mostly coincide with the end of the day and your SCN and liver then begin to sync down for sleep together.

Even if your sleeping window varies some - it should be the same 8 hours each 24 hour cycle - you should keep your feeding window in the same part of the day.

The cycle is simply day-eating and then night-fasting.

The second rhythm of eating is **digestion**. Every time we eat, even if it is a small snack, the entire process of digestion, absorption, and metabolism begins, and that takes time to complete. Typically, it takes 5 hours to digest and absorb nutrients after a meal. Even if you eat your meals within the prescribed 8 to 10 hour window, your digestive system is working 15-16 hours and is getting 8 to 9 hours to repair and rejuvenate. Since your digestive system runs slower during the

pm and during sleep, eating late at night can cause indigestion, poor blood sugar absorption and weight gain.

Rhythm 2 - Physical Activity

We are mostly designed to be active in the morning and again in the late afternoon and evening. Outdoor exercise with exposure to the morning light (picked up by the brain/SCN) is effective in suppressing melatonin (which has kept the pancreas dormant overnight) so that the pancreas can now activate to produce enough insulin to take care of the glucose rush from breakfast.

In the afternoon, physical activity:

1. Burns stored glucose (as glycogen) in the muscles, which,
2. Primes the muscles to absorb sugar from the evening meal since the pancreas may not produce sufficient quantities late in the day. For diabetics, exercise basically replaces the function of insulin in this manner.

Physical activity also uses the excess calories we might have consumed that day. Exercise also contributes to better sleep and also encourages the muscles to produce many biochemicals and hormones that improve the function of other organs - especially the brain.

Rhythm 3 - Sleep

Sleep is the most important rhythm to maintain. We need continuous, uninterrupted sleep for 6 to 8 hours every night, and this sleep should begin and end at a consistent time. If this rhythm is disrupted, its negative effects reverberate throughout the brain and body.

- 1, Exposure to light when we should be sleeping disrupts the SCN, which subsequently disrupts the entire circadian cycle in the brain and several hormone rhythms, **which in turn affects**,
2. The digestive system, leading to indigestion and exacerbating any other digestive issue
3. The heart may not work as well
- 4, The immune system may also become too reactive or too insensitive, increasing the risk for infection.
5. The brain may become foggy - which leads to making poor food and health decisions.
6. The brain hormones that regulate hunger may become confused which can lead to overeating and especially overeating energy-dense foods that can contribute to obesity
7. Our ability to feel "energetic". As lethargy settles in it also contributes to poor health choices such as skipping exercise.

Shift Workers

You don't have to do real shift work (between 10pm and 5am) to have the effects of being one. Shifting your sleep time or wake up time by 2-3 hours disrupts your circadian rhythms for 2-3 days. If your breakfast time changes by 2 or more hours in at least 2 days/week, you are eating

like a shift worker. If you eat or drink late at night during the weekend, you experience the same type of circadian disruption as if you are jet-lagged.

Establishing a chronically sufficient and rhythmic sleep pattern is a choice - a choice that will become the base from which all other good choices help align your natural circadian rhythms so that you can lose weight, become more healthy and have more physical energy, mental acuity and emotional stability to move forward each day towards your chosen life goals. Day by day, week by week - in the right direction.

Chapter 3 - The Circadian Breakthrough in Diabetes Research.

Healthy eating habits can counteract the bad effect of faulty genes. Mutant mice that lack a circadian clock that are put on a feeding program during which they ate within a fixed interval every day were protected from metabolic diseases.

In the last 50 years, there have been more than 200 studies regarding shift workers whose schedules do not allow them to eat or sleep at a consistent time. These studies included both men and women and were done in different countries that reflected a variety of eating styles and dietary combinations. All were in agreement: the longer someone is a night-shift worker, the higher the risk for developing diabetes.

After the **human genome** was fully sequenced (2000), three lines of study converged as a turning point in circadian science:

1. Some people who had either obesity or diabetes also had faulty circadian clock genes.
2. Mutations in a gene were found that created imperfect processing of information from the sleep hormone melatonin.
3. Mice with faulty circadian clock genes have difficulty controlling blood glucose and develop metabolic diseases. Also in mice, the vast majority of genes that turn on and off over a 24-hour period in the liver were involved in regulating how the liver controls sugar and fat storage.

The **conclusions** of the mouse studies was that those mice that ate within an 8 hour feeding window vs mice that ate anytime they wished (same food, same caloric loads) did not develop higher fasting blood glucose levels - even with a high carb and high fat diet. The 8 hour feeding window also led to a reversal in diabetes markers in mice that were already considered diabetic. The **time-restricted feeding** window also reduced their blood cholesterol, incidence of fatty liver disease, improved overall heart condition, motor coordination and muscle function, reduced inflammation and improved sleep quality.

Time-restricted feeding, time-restricted eating and intermittent fasting (IF) are one in the same concept.

Multiple studies have shown that most people can change from a 14-16 hour feeding window to an 8-10 hour window fairly easily. All who did so lost some weight, slept better, had less hunger at night and a better sense of overall energy. Some also reduced their total number of calories consumed per day. Most saw their blood glucose and blood pressure decrease. Those with high LDL cholesterol saw a reduction.

IF protocols are lifestyle choices to fight against gene mutations, especially those that are connected to our circadian rhythm. It makes the expression of those genes and the negative effects minimal at most.

Six Core Mechanisms and Benefits of Intermittent Fasting (IF)

Improved insulin function

Improved liver function

Increased fat loss

Reduced muscle breakdown

A healthier gut microbiome

Reduced inflammation

Chapter 4 - A Broken Circadian Rhythm Influences Diabetes

An optimum circadian rhythm is the foundation of a good lifestyle that can help you prevent, better manage, and even reverse diabetes and its complications. **Diabetes medications only manage symptoms**, like controlling your blood glucose levels; they do not address the underlying cause. They also do nothing to control blood pressure, blood cholesterol, an unbalanced immune system, stomach diseases, and other conditions that often accompany diabetes. Each of these complications may require different drugs to bring symptoms under control. Adopting a better circadian code addresses the underlying issues for all of these symptoms and conditions. It's about the "when".

Studies of shift workers that work at night instead of during the day give us a solid clue as to how detrimental having a circadian rhythm out of sync truly is. A large study of more than 8000 workers from 40 different organizations found that **shift workers** were more likely to suffer from infectious diseases, ranging from the common cold to stomach infections, than day shift workers.

Imagine how many times each month you eat a late dinner, enjoy a bedtime snack, go to bed 2 hours later or sleep less than 6 hours. Every time your circadian rhythm gets off balance, it can take 2 to 3 days for your body to readjust. If you do any of these things once a week, it's out of sync half the time. If you do any of these things twice a week - it is never truly in sync. Circadian scientists have termed staying up late 3 hours and then eating breakfast 3 hours later, **social jet lag**. It has the same effect as a traveler's jet lag on your body, brain and energy.

We must provide the body the ability to achieve a chronic **circadian rhythm base** in conjunction with:

Eating real food in controlled portions

Engaging in activity/exercise most days of the week

Establishing and maintaining a chronic and rhythmic sleep and wake time of 7-8 hours of sleep

Obesity - one major cause of diabetes - increases the risk for **obstructive sleep apnea**. Not having restorative sleep because you are not breathing correctly decreases energy during the day and reduces the drive to exercise. As physical activity reduces, the drive to sleep also reduces. As you can see, it becomes a circle of dysfunction, each part of the dysfunctional wheel driving the other parts in the wrong direction - together.

Lifestyle Choices that Affect Your Circadian Rhythm

Staying indoors under dim light most of the day

No daily activity/exercise

Exposure to bright light at night (any screen time) up until bedtime

Having caffeinated drinks or foods (chocolate) after lunch

Having a before-breakfast or after-dinner snack

Stress eating or eating in the middle of the night to help you fall back asleep

Not sleeping 7-8 hours consistently day in and day out

Food preferences that include large amount of processed foods and sugars

Having to time your meals to coordinate with others

Living with a shift worker

Being a caregiver to a child or adult

Working nights, early mornings or evening shifts

Switching from one shift to another every week or two

Any job that requires you to attend to communications of any kind beyond your normal hours of work

Long working hours up to 12 hours and beyond in a single day

Commutes of an hour or more each way to work

For students, school schedules that begin early in the morning

Almost all of the above are CHOICES. It's your life. Maybe it's time to rethink the whole pattern. Try something new. Feel better? Get healthier??

(Health Assessments - page 72)

Circadian Health Assessment #1: How Do You Feel?

Physical Health

Mental Health

Behavioral Habits

Circadian Health Assessment #2 - Track Your Day

When and How You Wake Up

Your First Bite/Sip of the DAY

The End of Your Last Meal/Drink

The Time You Exercise

The Time You Shut Off All Screens

The Time You Go to Sleep

Our **ancestors** all had these things in common: they ate less, did more physical activity, slept more, and completed their daily routines with clockwork precision because they did not have artificial light. In addition, by default, they were engaged in consistent intermittent fasting - eating within an 8-10 hour window - most if not every day.

When you put everything together correctly, you will also find that you eat less and are more satisfied with eating less and therefore by default will lose weight over time. As you have seen, correcting all the spokes of the circadian rhythm wheel makes the whole body work as designed, smoothly, in rhythm, each part making the other parts better as the wheel that is YOU moves effortlessly through the day.

The inverse, of course, is also true, and where most people in Western civilizations spend their entire lives - out of sync, overweight, lethargic and mostly unproductive and unhappy. Some know no other life. Now that you're starting to understand a better way, you can plan a better life.

It takes about **12 weeks** to adopt new habits and have it affect your gene expression. Existing habits and environments are like another layer of information affecting our DNA - **your epigenetic code** - and it reinforces your current habits and lifestyle. You have to have the WILL to change and stay with those changes over time. Eventually, a new epigenetic code will evolve and slowly take over, nudging and reinforcing the new behaviors, that initially, take a lot of BELIEF and WILL to sustain.

Chapter 5 - When to Eat

Intermittent Fasting (IF), creating an overnight fast, has many benefits that directly impact overall health and the prevalence and/or severity of diabetes.

1. Modifies how genes are expressed, thus lowering the chance of diabetes in multiple ways
2. Restores the balance between storing and burning fat
3. Makes the natural insulin production more responsive and appropriately released
4. Improves muscular function and reduces chronic muscle and joint pain
5. Lowers the inflammation related to diabetes and other chronic conditions
6. Enhances the gut flora to excrete more sugar
7. Improves outcomes of those already on medications

IF also addresses ailments that show up as the “sinister friends”, helping to reduce blood pressure to a healthy level, reduce the amount of bad cholesterol, and improve heart health. Lastly, consolidating one’s meals into a smaller window of time, it is possible to reduce caloric intake and reduce body weight over time. However, IF is not about counting calories - it’s about making you more disciplined about timing. When people do this consistently, they tend to eat less by default, and almost effortlessly. It’s about **you** getting control of when **you** eat.

It takes about 12 weeks to adopt a new habit and have it affect gene expression. There are simply 3 decisions you need to make to start

Step 1 - Choose Your Eating Window

There is no definitive on which type of fasting is sustainable for long periods of time. In most studies, the participants tended to drift from an 8 to a 10 hour eating window and still reap benefits from that 10 hour window. There are other IF variations you can try (Eat Stop Eat, Alternate Day Fasting, Warrior Diet, Spontaneous Meal Skipping, the 5:2 Diet, etc.). But at the end of the day, you are searching for an IF protocol that is sustainable for you, for years of time. If something is not sustainable, it is worthless, much like many other “diet” and “exercise” programs you may have attempted in the past.

It is suggested that you start with a 12 hour window for the first 2 weeks, then shift to a 10 hour window for the remaining 10 weeks of your 12 week program. If you find the 10 hour window fairly easy, you might try a 9 or 8 hour window. People tend to see faster improvements as they move towards the 8 hour window. The eating window you choose is EVERY DAY. No cheat day silliness. This is a choice, and a path, for 12 weeks, to find a new way to live a new life.

Step 2 - Decide How Many Meals to Eat

The recommendation to eat many small, nutritious meals throughout the day to maintain a consistent, healthy blood glucose level. This pattern is also suggested for those engaged in bodybuilding, with a different set of macros (protein, fat, carb) but nevertheless, the same eating pattern. Over the last 50 years, the creation of “healthy snacks” as a proportion of total calories has increased from one-tenth to one-fourth, the number of eating occasions now ranging from 4.2/day to 10.5/day! Obviously, regardless of the scientific validity of “healthy snacks”, as is often the case, it does not match up well with human behavioral reality.

You don’t have to feel full all the time and a moderate level of “hunger” is a good sign that your stomach is ready for a meal and is currently tapping into your stored energy/body fat. Please realize that your **nonconscious brain** is simply doing its job and letting you know that blood sugar is low and you should do something about it - that’s completely by design and is ingrained as a habit. However, that habit that has been created, has gotten you where you are - mindlessly relinquishing yourself to habitual control. This is where you have to stop and realize that it is happening, remind yourself that the sensation is a good thing (you’re burning fat), and

mentally move on. You will get used to these new sensations and as you gain control over this habit (and many others), you will begin the process of true and lasting change.

“Until we make the unconscious conscious, it will direct our lives, and we will call it fate.” Carl Jung

Step 3 - Set Your Start Time

Research tells us that it is healthiest to wait and eat breakfast 1-2 hours after waking up so that your nighttime melatonin levels can fully decrease, thus releasing your pancreas to full function for the first meal of the day.

Whatever the start time for breakfast, dinner (last meal) must be completed 12 hours later - or however many hours you've decided your feeding window will be. Once your body recognizes that no more food is coming, it will slowly transition to its repair and recovery mode. You should also plan your start of sleep time to be 3-4 hours after this last meal to ensure better digestion and optimum sleep.

The recovery mode at night while sleeping is as important as any other part of your day and your success depends on chronically sleeping 7-8 hours every evening. Caffeine can stay in your system for as long as 10 hours, so the conventional wisdom is to avoid caffeine past the midpoint of your day.

IF is a lifestyle change - forever. You have to experiment honestly and see which variations work best for you.

Tips for Shift Workers and Air Travel - pages 109-110

Typical Challenge for IF

- If you are currently prediabetic, diabetic or have any other health condition, always consult your primary care or other physician before embarking on an IF protocol.
- Make sure you let everyone who lives with you know what you are doing and what your new eating schedule will be. Explain the “why” so they will understand and invite them along for the experiment!
- Plan where/how you will eat if you leave home before breakfast or get home late. You have to have a Plan B and C for this new lifestyle. You should have a Plan B and C for just about everything.
- Research tells us there is a real 6-week hurdle to the program - the **danger zone**. If you are not quite seeing the results you expected at that time you can become discouraged. You must be patient and continue on for 12 weeks. You may not experience the level of weight loss you were expecting, but by 6 weeks you should already be realizing the benefits of better sleep, increased energy or a reduction in systemic inflammation - your

stomach feels better and possibly less headaches and muscle/joint pain. Your fasting blood glucose levels might already be better at 6 weeks so you can go ahead and get retested at that point.

From my experience, once your body has adapted to your new IF routine for 8 weeks or so, if you veer off course, your body will let you know - you won't sleep as well, have as much energy or be as mentally alert and emotionally balanced. The awesome thing is, once you get back on track for a day or two, you will start to feel better very quickly. After you have experienced this a few times, it will help solidify the fact that IF is better for you in the long run, and if you're being brutally honest with yourself - it just isn't that hard.

Chapter 4 - What to Eat

A balanced diet that combines complex carbs/fiber, fat and protein is important to nourish all of your body's organs. Choosing simple and process carbohydrates and consuming them in the wrong amounts and at the wrong time of day can disrupt the balance of the circadian rhythm

Complex carbohydrates digest at a slower rate and help regulate glucose better as well as keeping us sated longer between meals. Choose complex carbohydrates with fiber including raw fruits, raw vegetables and nuts. Barley flours, millet flours, amaranth flour, wholemeal flour, rolled oats and red or black rice have firmer seed coverings attached to them and are considered complex carbohydrates.

Foods to Avoid

1. No Ultra-Processed Foods

In general avoid a food time if:

- The food does not resemble anything in nature
- It comes in a packet
- It contains more than a handful of ingredients and you don't recognize most if any of the names of those ingredients

Almost all processed foods contain highly addictive added ingredients, like sugar, so we tend to eat more of them. These "foods" are so processed that they are easily digested, leaving us hungry in an hour or so after eating them, with the result that we eat more frequently - any time of the day or night. Eating processed food guarantees a rapid surge in blood sugar, multiple times every day and eventually, your fasting blood sugar will also rise as your pancreas can not keep up with the workload.

2. No Fizzy Drinks, Diet or OtherWise

Sweetened drinks of any kind are empty, worthless sugar calories that provide any other nutrients like vitamins and minerals to your diet. Drinking calories, frankly, is the dumbest of the

dumb habits. It has to stop. Drinks with artificial sweetener can change the good gut bacteria in a negative way. Our Western love affair with beverages of all kinds is beyond insanity.

3. No Packaged Fruit or Vegetable Juices

Preservatives in these juices can alter your guts microbiome and also cause leaky gut syndrome.

4. No Pre-Sweetened Breakfast Cereals

5. No Alcohol

If you already have diabetes, alcohol can accelerate damage to your kidneys, cause neuropathy, retinopathy and contribute to high blood pressure and high triglycerides. Alcohol consumption, more often than once a month or so, is not helping you win. At all.

6. No Foods With Added Sugar or Non-Sugar Sweeteners

> See pages 127-128 for the list of 60 items

There are a handful of artificial sugars that are okay to use in moderation to make foods taste sweet.

> See page 129 for this list of 8 items

Food to Choose and When to Eat Them

The backbone of this program is the **Mediterranean Diet**. While there is no single official diet, people in this region have embraced over the centuries: combining fresh fruits and vegetables, beans and nuts, healthy grains, lean proteins and dairy products.

So, simply choose the the complex carbohydrates that are whole foods, proteins such as eggs, fish, meat and poultry and monounsaturated fats that are liquid or soft at room temperature such as olive oil

Dr. Panda suggests that in general, your attempt to break up your daily caloric load in the percentages as follows:

Breakfast - 40%, at least an hour past waking

Lunch - 30%

Dinner - 30%

Play the Low-Glycemic Game

Start to choose more items with low-glycemic foods (complex carbs that take longer to absorb) instead of high-glycemic foods.

You can find a full GI index at GlycemicIndex.com/GI-Search. It is useful for determining how to sway out the foods you can't eat and choose their healthier versions.

What to eat at breakfast, lunch and dinner
> pages 134-140

The Circadian Code Shopping List
> pages 142-146

Chapter 7 - When to Exercise

Exercise improves diabetes and reduces the risk of diabetes by many different mechanisms.

1. During exercise and for the next 30-60 minutes, your muscles absorb glucose with very little help from insulin, essentially a back door from the blood to the muscles.
2. Diabetics who make less insulin or none at all can benefit from exercise since chronic exercise will reduce the need for medication or less or lower level insulin injections
3. Exercise increases the capillary bed (the smallest endpoints of your arterial blood supply) in the muscles so that glucose becomes more available for cells to use. This also brings more nutrients and hormones to the cells of the body to support repair and recovery. Strength training specifically causes this adaptation and benefit.
4. Increasing overall muscle mass over time with strength training by default helps control blood glucose and reduce diabetes since the muscles are the largest organ that absorbs glucose.
5. Exercise enhances length and depth of sleep and therefore enhances the circadian rhythms and the circadian rhythm in turn nurtures, repairs and rejuvenates the muscles, joints and bones both after eating and during the overnight fast.

Types of Exercise

Try to engage in the following every week:

1. Strength training - 2 to 4 times/week
2. Aerobic/Anaerobic training - 2 to 5 times/week
3. Stretching, Flexibility, and Balance - 5 times/week or more

I will disagree in part with Dr. Pandas recommendations on aerobic exercise type in that I do not suggest long, slow-distance aerobic exercise unless you just enjoy it. The perceived lack of time is the number one excuse for lack of exercise compliance. Also, performing interval type training instead, and also adding that into your strength training program will be better from a time perspective, I believe it is superior in most every other aspect as well.

The possibilities of how to choose and program activity and exercise that are effective and that can be enjoyable are pretty endless and a main part of what I do as a strength and conditioning specialist. Further explanation is beyond the scope of this summary.

When to Exercise

The first rule of thumb is that whenever you can exercise is the best time. Finding a consistent pattern, and time of day, of any day of the week, is the key to adherence. That being said, as you begin to get more control of your day and living each day on purpose, you will be able to “prepare and pivot” quite seamlessly and fit in exercise with no problem. I strongly believe that if most people truly attempt modifying their lifestyles into a more natural, circadian rhythm schedule, the best time is to exercise early in the morning (or before you start your day). If you can get outside at some point for some sunshine, so much the better.

You can break up your total exercise time goals per week into **blocks as small as 10 minutes** each, but realize that those 10 minute blocks need to be fairly vigorous. If your schedule (or your perceived schedule) is so full that you can't find enough 10 minute blocks in a seven day frame of reference to complete your exercise plan, what you fill your day with is your problem - not exercise. And honestly, that's most people's problem. You need to stop, take a breath, and really analyze how you spend your time each day. Most people, when brutally honest with themselves, will realize they have more than enough time to exercise if they delete all of the superfluous, mind-numbing activities they engage in. Most of those involve looking at a screen.

Your choices so far have led you to where you are. You can play the blame game on the world all you want. Ultimately, your life is your own, whether you want to believe and embrace that is up to you.

Chapter 8 - Optimize Recovery - Sleep and Light Exposure

There is an emerging consensus that sleeping less or having disrupted sleep affects brain function, imbalances hormones, and increases inflammation, all of which negatively affect blood glucose. Fewer than 6 hours of sleep on a consistent basis is correlated with an increased risk for developing pre-diabetes, diabetes, and the sinister friends of diabetes - obesity, hypertension and heart disease.

Sleep deprivation literally rewires the brain and it thwarts detoxification that occurs during a 7-8 hours sleep. Since the brain is the master regulator of almost all hormones in the body, sleep loss changes the level of the timing of every major hormone. A sleep deprived brain also craves excessive calories that it does not need which will result in weight gain, the stress hormone cortisol not reducing sufficiently during the night.

Poor sleep can cause changes in the immune system, inflammation not reducing during sleep as it is designed to do. Unnecessary and chronic activation of the immune system contributes to diabetes and heart disease.

Many people who are overweight and/or diabetic also have **sleep apnea**, one of the major causes of sleep deprivation. The effect of sleep apnea is to wake a person up just enough to

breathe again, although not to the point of being consciously aware of being awake. These upsets can happen all through the night and the person often has little or no clue it is happening. Some people with sleep apnea snore, but not all of them. Sleep apnea affects not only the quality and quantity of a person's sleep but also one's brain health. **Cognitive problems**, such as deficits in memory, attention, and visual abilities, frequently accompany obstructive sleep apnea. A sleep study can determine if you are suffering from this malady.

Sleeping is not a shutting down of bodily functions; instead, a whole different assortment of essential bodily functions take place that cannot happen when we are awake. At night, we aren't just making necessary repairs to the body; the brain is also consolidating memories and sending out instructions to prepare us for the next day. Adults with poor sleep habits are more likely to develop anxiety and depression, and seniors may experience memory impairment. **Chronic joint pain** may also be the cause of chronic sleep deprivation.

The Perfect Amount of Sleep

As soon as we wake up, the **SCN begins keeping track** of our wakeful time. For every hour we stay awake, we later have to sleep 20 to 30 minutes. In the evening, the organs' unique clocks synchronize with one another to create the perfect conditions for sleep. The pineal gland inside the brain begins to produce the sleep hormone melatonin. At the same time, the heart clock instructs the heart rate to slow down. Then, when the timing is right and the lights are low, you go to sleep.

Every night, adults should give themselves 8 consecutive hours of "**sleep opportunity**" (sandwiched between your sleep transition process and your waking transition process), and children should have 10 hours of the same. Transition to sleep should be followed by 2-3 hours of reduced or eliminated screen time and include getting into bed, settling down, and then falling asleep.

A **sleep debt** is the difference between the amount of sleep you should be getting and the amount you actually get. Sleep debt must be repaid time for time. A sleep debt carried over to the next night does not get erased by getting your normal amount of sleep - you have to pay the debt in time eventually. This is why most people sleep late on the weekends - and waste Saturday mornings for the most part. Your circadian clock will only let you sleep so many hours at a time. It may take days or weeks to repay a chronic sleep debt, and within all of those days you will have less energy and be less cognitively acute. As you can see, accumulating large amounts of sleep debt literally robs you of being the real you, the best you. Extrapolated over months or years, you might ask yourself the question - **how often have I truly been the real me?**

Naps can help repay sleep debt, but be cautious how long you nap - it can negatively affect the next night's sleep.

Are You Sleeping Well?

1. When do you go to bed, and how long does it take you to fall asleep?

An average person who has good sleep habits should be able to fall asleep within 20 minutes of getting into bed and shutting off the lights. During this 20 minutes - no book, no phone, no light. If you have difficulty doing this, you may have some level of insomnia - difficulty falling asleep.

The main culprits of **insomnia** are:

Worry - this increases production of the stress hormone cortisol, which is meant to keep us awake.

Food - too much food keeps the body core temperature too high for sleep

Activity/Exercise - too little reduces the production of the muscle hormone that promotes sleep.

Bright Lights - too much time in bright light in the evening reduces the production of the sleep hormone melatonin.

2. How many times do you wake up during the night?

Fragmented sleep is defined as waking up more than once during the night for at least a few minutes, to the point where it is difficult to go back to sleep. Continuous, uninterrupted sleep gets the brain into deep sleep and the interruptions and time needed to get back to sleep deprives you of this critical deep sleep time - more than you would think.

The main causes of fragmented sleep are:

Dehydration

Ambient room temperature being too hot or cold

Acid reflux caused by eating too late at night and/or being overweight

Sleeping with a person/pet that wakes you up at night

Snoring/sleep apnea

Other environmental noises

3. Do you feel rested when you wake up in the morning?

If not, main causes are insufficient sleep due to difficulty falling asleep and/or fragmented sleep.

Other causes are:

Sleep debt from previous day

Sleep apnea

Light or sounds during sleep. Although you may not fully awaken, light or ambient noises may be disturbing your REM and deep sleep cycles.

Thing You Can Do To Increase Sleep Quantity and Quality

Eating a mostly Mediterranean-based diet that includes oily fish like salmon, nuts such as walnuts.

Do not drink alcohol - it dehydrates and negatively affects blood pressure, heart rate variance, heart rate and body temperature during sleep. And also when you're awake.....

Do not eat late at night - have your last meal 2-4 hours before bed time.

Manage light exposure correctly to keep melatonin levels in sync - step outside as early as possible and get 30 minutes of sunlight is best. Do the opposite in the evenings by eliminating blue light exposure from electric lights and screen lights.

Turn down the where you sleep

Experiment with ambient noise - some sleep better in total silence, some better with the rhythmic sound of a fan or other environmental sound pattern.

Snoring - experiment with appliances that hold your nostrils open or a mouth implant. It is important enough to work on until solved. If you have to, see and ENT or pulmonary medicine sleep specialist.

Sleep medications are NOT a permanent cure for sleep problems - chronic, sufficient sleep is critical to the circadian rhythm process. You have to get this one ironed out, however long it takes.

Do not STRESS about sleep - this only makes it worse. Devise a plan for a week, work the plan, keep modifying it till you find some success. I'm still tweaking mine to this day. I don't STRESS about it, it 's just one of the things I attend to on purpose each and every day. Seven days a week.

Transition From Sleep

I strongly suggest that you schedule your wake time (and thus your bedtime), so that you can create a period of transition each morning from sleep to wake. I have found that other than my getting ready ritual of hygiene and dressing for the day, I do best when I have an additional 30 minutes just for me.

This isn't time to "pre-think" the day. You should have that planned out already to help alleviate stress before bed time.

I suggest finding a quiet place (for me that is outside) and just simply sit and breathe. If you are a religious person, this would be an opportune time to read from your religions written teachings to help your mind and soul get centered for the day. Remind yourself who you really are, what your values are and how you intend to interact with the world.

Listening to music that is appropriate for you that sets your mind in a positive tone can also be helpful.

Some people schedule exercise first thing in the morning - which I completely and enthusiastically agree with. Although you might combine transition with exercise effectively, I suggest separating them out as well, and also trying them on either side of each other.

The transition then is to give your brain and body time to wake up in a stress-free way and to set your head and heart in the direction you have decided they will go. You should find your day at your vocation starting in a much better frame of reference this way, and maximize your circadian rhythm in the process.

As you get further into a chronic morning transition process, keep a legal pad and pen handy. Your brain will be fully recovered and just the small spark of an idea, or project you've been considering will open up fresh insights that will often amaze you.

Chapter 9 - Managing and Reversing Diabetes Symptoms

Pages 191 to 218

Chapter 10 - The 12-Week Challenge

Pages 219 to 247