Lifestyle Drivers of Type 2 Diabetes

Read it before the workbook, or after it as a quick review

Food sets the load. Stress, timing, sleep, movement, company and alcohol decide how well your body handles it.

1 Not a fluffy side issue

Diet feels like the real work, so stress, sleep and movement can seem less physical. They aren't. Your daily habits are **lifestyle inputs** that change how your body works, over hours to decades. In the kitchen picture, too much food arriving is still the central problem, but deliveries can also arrive at the wrong time, to a tired, disorganised household, so even a sensible load piles up. Stress releases more glucose and fat into the blood. A disrupted **circadian rhythm**, the body's roughly 24-hour cycle, changes how you handle food at different times. Poor sleep makes the liver harder to restrain and muscle less responsive to insulin. Inactivity weakens the main route for clearing glucose. Once insulin resistance has narrowed your margin, small shifts in these can cause large changes in glucose and appetite, even with no change on the scales. That is part of why diabetes can appear at lower weights, and why fixing a few daily habits can pay off.

2 Cortisol erodes glucose control

Cortisol, the "stress hormone" made by the **adrenal glands** above your kidneys, brings fuel out of storage, adjusts immunity, pauses repair and growth, and sharpens attention. It follows a daily rhythm: a slow **circadian ramp** before waking, a sharp 30–60-minute rise on waking (the **cortisol awakening response**), then a decline to a low at bedtime. Cortisol tells the liver to release glucose and makes it less responsive to insulin's "stop" signal. The resulting early-morning rise is the **dawn phenomenon**. In good health, extra insulin matches it; with insulin resistance, it can add a lot to overall glucose. Trouble comes from the wrong amount of cortisol at the wrong time, for too much of the day.

3 Stress, cortisol and glucose

Cortisol is controlled by the **HPA axis**: the **hypothalamus** in the brain weighs up threat, the **pituitary** passes the message on, and the adrenals release cortisol, which normally switches itself off by negative feedback. Psychological stress uses the same circuit as physical danger, and triggers **adrenaline** too: a deadline can look like a tiger. Repeated stress causes **persistence** (cortisol stays high for longer) and **rhythm distortion** (a flatter daily curve with less low-cortisol time for repair and deep sleep). The liver keeps releasing glucose, muscle and fat resist insulin, more fat enters the blood and the pancreas works harder. In the kitchen, cortisol is a helper shouting "emergency!" and pulling food back out of the pantry while insulin tries to pack it away. Long-term high cortisol also breaks down muscle, shrinking your glucose store. **Open-loop stresses** with no clear end, such as money worries, work pressure or caring, can keep glucose stubborn despite good eating.

4 Your body clock, out of time

A **master clock**, the **suprachiasmatic nucleus (SCN)** in the brain, is set mainly by light reaching the eyes. **Peripheral clocks** in the liver, pancreas, muscle and fat follow it, like musicians following a conductor, but they also take cues from meals, activity and hormones. Insulin sensitivity and glucose tolerance are better earlier in the day. In the evening, the **pineal gland** releases **melatonin**, which can reduce insulin release by the beta cells. So the same meal at 8 a.m. and at 10 p.m. are different metabolic events, and the late one usually causes a bigger, longer rise. **Circadian disruption** from late light, shift work, irregular sleep, late meals and jet lag pulls the clocks out of step. A well-timed day can't rescue a poor diet, but a good diet works better with your clocks.

5 Poor sleep drives insulin resistance

When Spiegel and colleagues let healthy young men sleep only four hours a night for six nights, with no change in diet, their glucose clearance fell by about 40% and their insulin response by about 30%. That is a profile like that of much older adults with prediabetes. Sleep loss switches on stress physiology. It also raises the hunger hormone **ghrelin**, weakens fullness signals and boosts cravings, while lowering mood, patience and energy. "I can't face the gym" may really be a few late nights. **Obstructive sleep apnoea**, where the airway keeps closing during sleep (snoring, waking, morning headaches, daytime sleepiness, high blood pressure), makes glucose control much harder and should be discussed with your doctor. Sleep is a metabolic regulator.

6 Inactivity shrinks your biggest glucose sink

A **glucose sink** is where glucose is pulled in for storage or use. Muscle can handle up to half of the glucose cleared after meals. Working muscle brings GLUT4 to its surface by contraction, with much less need for insulin, so a walk after a meal gives arriving glucose somewhere useful to go. Inactive muscle loses that route, becomes less insulin sensitive and burns less fuel, so more glucose and fat stay in the blood, adding to energy toxicity. Inactivity also upsets **appetite calibration**: when Stubbs and colleagues compared active and sedentary weeks with food freely available, people matched intake to need when active, but overate and gained fat when sedentary. Inactivity lowers mood and makes movement feel harder, a trap where each effect feeds the others. **Resistance training** breaks it: more and better muscle stores and burns more glucose, and stronger muscles make everyday movement easier. About 2–3 hours of exercise a week, on top of an active day, brings large benefits.

7 Social life can support or sabotage

We eat, drink, sleep and worry inside a social world. Supportive people make change smoother: adjusted meals, shared walks, declining a drink without a fight. Other settings push you towards late nights, alcohol, irregular eating and unplanned food, through office doughnuts, drinking culture or evenings lost to the TV. This isn't about blame: your surroundings shape you whether you plan for them or not.

8 Alcohol is a metabolic poison

The liver treats alcohol as a **priority toxin** and breaks it down first, which upsets its glucose balance. With some glucose-lowering medicines, that can cause low blood glucose. More often, evening drinking means poorer sleep (alcohol fragments the second half of the night and worsens breathing), lower restraint, more eating and higher fasting glucose next morning. Breaking alcohol down also drives fat-making in the liver, adding to the ectopic fat this programme is trying to remove. National drinking guidelines are not the right target here: for reversal, less is better and much less is much better, with most weeks alcohol-free.

9 Medicines and other hidden inputs

Some medicines can raise glucose, including **corticosteroids**, some antipsychotics and, slightly, statins, whose heart benefits usually outweigh this. Illness, infection, pain, injury, menstrual cycles, menopause, travel and bereavement can all move glucose without any change in diet. At those times, don't blame yourself: keep to a sensible plan and give results extra time.

JOINING IT UP

Diet sets the load, and lifestyle sets how well your liver, muscles and pancreas cope with it. Calmer stress, steady timing, enough sleep, regular movement, supportive company and little alcohol all widen your margin. Chapter 11 turns this into practice.