



NH

NATALIE HENNESSEY
NATUROPATHIC DOCTOR

INSULIN RESISTANCE/ PREDIABETES GUIDE

Dr. Natalie Hennessey, ND





WELCOME

Thank you for taking the time to download this guide on an evidence-based approach to insulin resistance & prediabetes. Living with these conditions can feel confusing and frustrating, especially if you've been told to "just lose weight" or "cut out sugar" without much guidance. But fortunately, naturopathic doctors have many tools in our toolkit to help support healthy blood sugar levels and reduce your risk of developing type 2 diabetes.

As you'll learn, insulin resistance is influenced by a wide range of lifestyle, nutritional, and environmental factors, and identifying and addressing the cause is key to reversing it.

As you read through this guide, it's important to keep in mind that the advice provided is of a general nature and does not take into account your individual circumstances. It cannot be used to diagnose or treat a health condition. Please consult with a qualified healthcare practitioner before making any major diet & lifestyle changes.

INSULIN RESISTANCE OVERVIEW

Insulin resistance is a condition where the body's cells become less responsive to the hormone insulin, which plays a crucial role in regulating blood sugar levels. Normally, when we eat, our blood sugar rises and insulin acts like a key, unlocking cells to allow glucose to enter. In insulin resistance, cells don't respond appropriately to insulin. When this happens, the body needs to produce more and more insulin to keep blood sugar levels in balance. Over time, this can lead to elevated insulin and blood glucose levels, weight gain (especially around the abdomen), inflammation, and eventually, prediabetes or Type 2 diabetes.

Early Insulin Resistance

In the initial stages of insulin resistance, blood sugar levels usually remain normal, but insulin levels rise as the body works harder to keep your blood sugar in range. This stage often has no symptoms and is easily missed as insulin levels are rarely tested. For this reason, it's important to get your fasting insulin or TG:HDL levels tested alongside glucose to allow for early intervention. By the time glucose levels rise, insulin resistance is already well established.





Prediabetes

Insulin resistance puts the pancreas under pressure to produce more and more insulin, and over time it can't keep up. Eventually blood sugar levels rise, especially in the morning (fasting) and after meals. This is the point where doctors begin to realize something is wrong, based on elevated fasting glucose and HbA1c in a blood test. By this point, insulin resistance has often been present and undetected for years.

Type 2 diabetes

After the pancreas has been under strain for some time, it begins to fail and insulin production drops. The body struggles to keep blood sugar levels within range and they can rise consistently, which can damage blood vessels, nerves and organs. This stage often requires medications and eventually insulin.

Can We Reverse Insulin Resistance?

The short answer is yes, but the earlier the action is taken, the better the outcomes are. Reversal is most likely when it is caught in the insulin resistance or prediabetes stages, when the pancreas is still producing insulin, and when the root cause is identified and addressed.

TESTING

Understanding what's happening with your blood sugar and insulin levels is key to catching metabolic issues early and understanding which stage of blood sugar dysregulation you are in.

Test	Optimal range	Definition
Fasting Glucose	<5 mmol/L <90 mg/dL	<ul style="list-style-type: none">Measures your blood sugar after not eating for at least 8 hoursPrediabetes: 5.5–6.9 mmol/L (100–125 mg/dL)Diabetes: 7.0+ mmol/L (126+ mg/dL)
Fasting Insulin	<8 mU/L	<ul style="list-style-type: none">Measures how much insulin your body produces when fastingHigh fasting insulin - above 8mU/L indicates insulin resistance (even if fasting glucose is normal)
HbA1c	<5 %	<ul style="list-style-type: none">Reflects your average blood sugar over the past 2–3 monthsPrediabetes: 6.0–6.4%Diabetes: 6.5% and above
HOMA-IR	<1.9	<ul style="list-style-type: none">A calculated score using fasting insulin and glucose.1.9–2.9: Early to moderate insulin resistance>2.9–3.5: Significant insulin resistance>3.5: Often seen in prediabetes or early Type 2 diabetes
Triglyceride: HDL ratio	0.9-1.9	<ul style="list-style-type: none">A calculated value used to assess cardiometabolic health, insulin resistance, and cardiovascular disease risk.A higher ratio indicates a greater risk, often linked to smaller, denser, and more harmful LDL particles, while a lower ratio is desirable.

ADDITIONAL TESTING

Triglycerides, LDL & HDL cholesterol: People with insulin resistance often display altered lipid levels, including high triglycerides, high LDL (bad cholesterol) and low HDL (good cholesterol). These factors combined with insulin resistance or high glucose significantly increases cardiovascular risk.

Vitamin D, Magnesium and Zinc: Important nutrients for insulin sensitivity and blood sugar control.

Liver function test: Non-alcoholic fatty liver disease (NAFLD) is often associated with insulin resistance and can be detected through elevated liver enzymes such as ALT. Fat accumulation in the liver can further impair metabolic health, worsen insulin sensitivity, and increase inflammation.

Thyroid Panel (TSH, Free T3, Free T4, antibodies): An underactive thyroid can worsen insulin resistance and metabolic dysfunction.

Estrogen, Progesterone, Testosterone, DHEAs: Hormones play a key role in metabolic health. In women, low estrogen (such as during perimenopause or menopause) can negatively affect insulin sensitivity, increase abdominal fat, and contribute to higher LDL cholesterol and triglycerides. Elevated androgens like testosterone and DHEA-S, commonly seen in PCOS, are often driven by high insulin levels.

hs-CRP: This test can help to identify persistent low-grade inflammation, which can interfere with how insulin works and make blood sugar harder to control.



UNDERLYING DRIVERS

Insulin resistance is a multifactorial condition that develops over time due to a complex interplay of genetic, hormonal, nutritional, inflammatory, and environmental influences. There is rarely a single cause, but rather a combination of factors that disrupt how the body processes and responds to insulin. Identifying and addressing these drivers is key to reversing insulin resistance and preventing progression to prediabetes or Type 2 diabetes. Common contributing factors include:

Western-style diet

The standard Western diet is rich in processed foods, salt, refined carbs and unhealthy fats, and low in fibre, antioxidants, and essential nutrients. Research shows that this way of eating is a major contributor to insulin resistance, as it spikes blood glucose levels, increases fat storage (especially around the abdomen), disrupts insulin signaling, alters gut health, and contributes to nutrient deficiencies like magnesium and zinc [1].

Lifestyle Factors

Physical inactivity reduces glucose uptake in muscle cells, promotes weight gain, and decreases insulin sensitivity. Exercise and

building muscle mass increases the number and function of glucose transporters (GLUT 4) on cells, improving insulin action even without weight loss [2]. Another key factor is sleep quality, and studies show a significant association between sleep deprivation and insulin resistance [3].

Chronic Stress

When you're under chronic stress your body produces more cortisol. Cortisol helps you cope short-term, but if it's chronically elevated it can trigger low-grade inflammation, raise blood sugar levels and promote insulin resistance. Studies have shown that stressful life events are positively correlated with a higher incidence of diabetes [4].

Nutrient Deficiencies

Low levels of key nutrients such as magnesium, vitamin D, chromium, and zinc have been associated with impaired insulin signalling and glucose tolerance. Addressing deficiencies can improve metabolic function in many individuals [5,6].

Gut Dysbiosis

Alterations in gut bacteria can influence inflammation, nutrient metabolism and insulin sensitivity. Increased intestinal permeability may allow bacterial endotoxins (e.g., LPS) to enter circulation and trigger systemic inflammation [7].

Environmental Toxins

Research suggests a strong link between exposure to endocrine-disrupting chemicals (EDCs) and the development of insulin resistance. Chronic, low-level exposure to chemicals such as BPA, PFAS and phthalates may increase the risk of insulin resistance over time [8].



OPTIMISING YOUR DIET

The most well-researched diet for insulin resistance and prediabetes is a Mediterranean-style diet rich in vegetables, whole grains, legumes, nuts, seeds, extra-virgin olive oil, and quality protein.

A large study from Poland found that participants who followed the Mediterranean diet had better glucose control, lower inflammation, less abdominal fat, and improved HDL (good) cholesterol levels. Additionally, the closer they followed the diet, the lower their risk of developing prediabetes, with each point of adherence associated with a 10% reduction in risk [9].

Another smaller study found that a high-protein diet was more effective than a Mediterranean-style diet in reducing insulin resistance and improving blood sugar stability (glycemic variability) in women with prediabetes and obesity. While both diets resulted in similar weight loss, likely due to being calorie-matched, only the high-protein diet significantly improved insulin sensitivity and reduced fluctuations in blood glucose levels [10].

DIETARY RECOMMENDATIONS

1.

Prioritize non-starchy vegetables at every meal

Vegetables like zucchini, broccoli, leafy greens and bell peppers are high in fibre, low in carbohydrates and packed with antioxidants. They help slow digestion, support gut health, and reduce blood sugar spikes after meals. Aim for 1 cup cooked or 2 cups raw veg with each meal and **eat them first**.



2.

Include quality protein with each meal

Protein helps stabilize blood sugar, reduce cravings and support muscle mass (which improves insulin sensitivity). Include foods like eggs, fish, legumes, tofu, tempeh, chicken, turkey, and plain Greek yogurt throughout the day.



3.

Choose slow, high fibre carbohydrates

Instead of refined carbs (white bread, pasta, baked goods), opt for whole grains (like quinoa, oats, barley), legumes, and root vegetables in moderation. These support steadier blood sugar and provide essential nutrients and prebiotic fibre.



4.



Limit added sugars and ultra-processed foods

Avoid or strongly limit sugary drinks and processed-packaged foods, as these are known contributors of insulin resistance. For some people, completely avoiding all sources of added sugars and processed foods is necessary to bring their insulin and glucose levels down.

5.

Eat regular meals

Avoid skipping meals or grazing constantly throughout the day. Instead, aim for 3 balanced meals, with a snack if needed, spaced every 3–5 hours. Constant grazing or eating large meals can keep insulin elevated throughout the day. Regular, balanced meals promotes better blood glucose control.



6.



Move your body after eating

Gentle movement after meals, such as walking, squats, or calf raises, helps lower blood sugar by encouraging your muscles to use glucose for energy. This reduces the insulin needed to manage a meal and supports better blood sugar balance.

BUILDING A HEALTHY PLATE



Begin with the protein

Include a palm-sized portion at each meal, avoiding processed animal and plant protein sources. Choose from:

Plant protein: tempeh, tofu, beans, lentils, chickpeas, edamame, quinoa, buckwheat, protein powder, nuts & seeds.

Animal protein: eggs, halloumi, feta, Greek yogurt, fish (salmon, sardines, mackerel), chicken, turkey, unprocessed grass-fed meats



Add your vegetables

Aim for half your plate to be full of non-starchy veg. Choose from:

Cruciferous veg: broccoli, Brussels sprouts, cauliflower, cabbage

Leafy greens: kale, arugula, spinach, bok choy

Colourful veg: carrots, bell peppers, radish, onion, garlic, tomato, pumpkin, beets (without sugar), asparagus, fennel, green beans, zucchini, cucumber, green or yellow beans

BUILDING A HEALTHY PLATE



Add your carbs

Stick to fibre-rich low GI carbohydrate sources. Aim for 1/8 to 1/4 of your plate, but tailor portion size to your individual glucose response. Choose from:

Whole grains & legumes: oats, brown rice, quinoa, buckwheat, beans, lentils, chickpeas, rye, spelt, polenta

Fruit & veg: sweet potato, pumpkin, beets, parsnip, corn, berries, banana, pineapple, dates, mango, kiwi



Add your healthy fats

Aim for 1-2 tablespoons of healthy fats at every meal. Choose from:

Good quality extra virgin olive oil, coconut oil, coconut cream, avocado oil, flax oil

Nuts & seeds: walnuts, almonds, cashews, Brazil nuts, hempseeds flaxseeds, pepitas

Oily fish: salmon, sardines, mackerel, tuna, trout

MEAL IDEAS

Breakfast

- Overnight oats with chia seeds, cinnamon, Greek yogurt and blueberries
- Avocado and salmon on wholegrain toast with tomato, feta and hempseeds
- Protein smoothie with spinach, banana, quality protein powder, Greek yogurt, flaxseeds, milk of choice and berries
- Omelette with fresh vegetables and herbs

Lunch

- Grilled chicken salad with leafy greens, fresh herbs, feta, nuts and an olive oil dressing
- Falafel wholewheat wrap with hummus, fresh herbs and vegetables
- Quinoa salad with chickpeas or canned mackerel & a rainbow variety of salad veg
- Zucchini & spinach frittata

Dinner

- Grilled salmon with roasted vegetables
- Lentil bolognese with wholegrain pasta
- Tofu or chicken stir fry with soba noodles
- Bean burrito bowl

Snacks

- Vegetable sticks with hummus
- Handful of mixed nuts
- Rice cakes with avocado
- Greek yogurt with berries
- Apple slices with almond butter



THE IMPORTANCE OF EXERCISE

Daily exercise is a non-negotiable for insulin resistance and prediabetes. When you move, your muscles contract and act like a sponge, soaking up glucose from your bloodstream. This happens thanks to something called GLUT4 transporters, which are like little doorways on your muscle and fat cells. Normally, insulin signals these doors to open so glucose can enter. But exercise can open them independently of insulin, helping lower blood sugar naturally, even if your body is insulin resistant. Additionally, the more muscle mass you have, the more glucose your body can clear from the bloodstream; therefore, building muscle is one of the most effective strategies for improving insulin sensitivity and reversing insulin resistance.

A 2023 meta-analysis found that resistance training alone significantly improves insulin sensitivity by reducing fasting insulin and HOMA-IR levels in adults with overweight or obesity [11]. Aerobic exercise has also been shown to reduce insulin resistance by reducing inflammation and oxidative stress, and improving insulin signalling [12].



How much exercise do I need?

Ideally, you should aim for at least 150 minutes of moderate-intensity aerobic exercise per week (20-40 minutes daily) plus 2-3 sessions a week of resistance training targeting all major muscle groups.

If you're new to exercise, any movement is better than none, so focus on consistency over perfection. Begin with a short 10-minute walk daily or 10 squats while watching TV, and work your way up. Exercise with a friend for accountability or join a group fitness class.

Strength training	Bodyweight push-ups, dumbbells, resistance bands, deadlifts, lunges	3 times a week
Aerobic exercise	Walking, jogging, cycling, dancing, swimming, jumping rope	4-6 times a week
Mind-body movement	Yoga, pilates, tai chi, qi gong	2-3 times a week
Restorative Movement	Stretching, mobility movement	Daily
Recovery/rest day	Intentional rest, gentle walking	At least 1-2 days a week



LIFESTYLE TIPS



Morning sunlight

Getting natural light in the morning helps regulate circadian rhythms, which support healthy insulin sensitivity. Aim for 10-20 minutes of natural sunlight within an hour of waking.



Quality sleep

Prioritising 7–9 hours of quality sleep per night improves glucose control. Use warm, dim lighting at night. Avoid caffeine & alcohol 4-6 hours before bed. Stick to a consistent bedtime routine.



Stress management

Chronic stress raises cortisol, which can impair insulin sensitivity and raise blood sugar. Try daily relaxation techniques like deep breathing, yoga, or journaling, and build in moments of calm.



Avoid smoking and vaping

Tobacco and vaping products increase oxidative stress and inflammation, both of which impair insulin function. It's important to completely avoid them.



Limit alcohol

Alcohol can increase blood sugar spikes, worsen insulin resistance, and contribute to abdominal fat gain. Complete avoidance may be necessary.



Reduce toxin exposure

Choose glass or stainless steel over plastic, avoid non-stick cookware.

HELPFUL SUPPLEMENTS

Chromium

Chromium is an essential trace mineral involved in carbohydrate and lipid metabolism. Research shows that chromium supplementation may significantly reduce fasting glucose, insulin levels, HOMA-IR (a marker of insulin resistance) and HbA1c in those with insulin resistance or type 2 diabetes [13,14]. Chromium picolinate is the most well-researched form and is commonly used.

Magnesium

Magnesium plays a key role in insulin signalling, and low magnesium levels are common in people with insulin resistance and metabolic dysfunction. A randomized clinical trial in women with PCOS, an insulin-resistant condition, found that supplementing with magnesium daily for two months significantly reduced fasting insulin levels and HOMA-IR [15].

Berberine

Berberine is a plant compound with strong evidence for improving insulin resistance and blood sugar control. A 2022 umbrella review found that berberine significantly improved fasting glucose, insulin sensitivity, cholesterol levels, inflammation, and body composition across multiple clinical trials [16]. Berberine should only be taken under the care of a practitioner due to its ability to upset the gut microbiome.



Myo-inositol

Myo-inositol is a naturally occurring compound that has been widely studied and used in people with insulin resistance, PCOS, type 2 diabetes, metabolic syndrome, and gestational diabetes [17]. High blood glucose levels can deplete myo-inositol in the body by increasing its breakdown and excretion. It's generally a very safe and well-tolerated supplement.

Cinnamon

A 2022 meta-analysis found that cinnamon supplementation significantly lowered fasting blood glucose, HbA1c, and HOMA-IR. However, it had little effect on fasting insulin levels. These results suggest that cinnamon may be beneficial, particularly when used alongside other dietary and lifestyle changes. Ceylon cinnamon (also known as “true” cinnamon) is generally preferred over Cassia cinnamon due to lower coumarin content, which is safer for long-term use [18].

Nigella

Nigella sativa (also known as black cumin seed) is gaining increased attention as a natural option to support blood sugar control. A 2023 systematic review found that various forms of Nigella sativa, including oil, powder, and extract, improved fasting blood glucose, HbA1c, and insulin resistance in people with type 2 diabetes, especially when used alongside conventional medication [19]. While results are promising, it's best used under the supervision of a practitioner.



BOOK YOUR PERSONALIZED VISIT TODAY

Dr. Natalie Hennessey is an evidence-based naturopathic doctor with a focus in metabolic health, women's health, skin and gut health, and holds a Bachelor of Science in Biology from the University of Prince Edward Island and a Doctor of Naturopathy from the Canadian College of Naturopathic Medicine.

Dr. Natalie is passionate about providing her clients with the individualized care, attention, and empowerment they need to achieve optimal health.

Dr. Natalie is a member in good-standing with the Canadian Association of Naturopathic Doctors (CAND), New Brunswick Association of Naturopathic Doctors (NBAND) and the PEI Association of Naturopathic Doctors (PEIAND)

[Book Your Visit Here](#) (virtual available)



REFERENCES

1. <https://PMC10003782>
2. <https://pubmed.ncbi.nlm.nih.gov/38771888/>
3. <https://PMC9036496>
4. <https://PMC8971350/>
5. <https://pubmed.ncbi.nlm.nih.gov/34959910/>
6. <https://pubmed.ncbi.nlm.nih.gov/32585827/>
7. <https://PMC3705322/>
8. <https://PMC10656111>
9. <https://PMC12195878>
10. <https://PMC8707429>
11. <https://pubmed.ncbi.nlm.nih.gov/37331899/>
12. <https://pubmed.ncbi.nlm.nih.gov/30605232/>
13. <https://pubmed.ncbi.nlm.nih.gov/39541030/>
14. <https://pubmed.ncbi.nlm.nih.gov/32730903/>
15. <https://pubmed.ncbi.nlm.nih.gov/37393389/>
16. <https://pubmed.ncbi.nlm.nih.gov/36999891/>
17. <https://PMC8896029>
18. <https://pubmed.ncbi.nlm.nih.gov/37818728/>
19. <https://PMC6950756/#sec4-ijerph-16-04911>