

Insulin Resistance

DNA Health Report

REPORT CATEGORY —



Sample Client

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DISCLAIMER

This report does not diagnose this or any other health conditions. Please talk to a healthcare professional if this condition runs in your family, you think you might have this condition, or you have any concerns about your results.

Personal information

NAME

Sample Client

SEX AT BIRTH

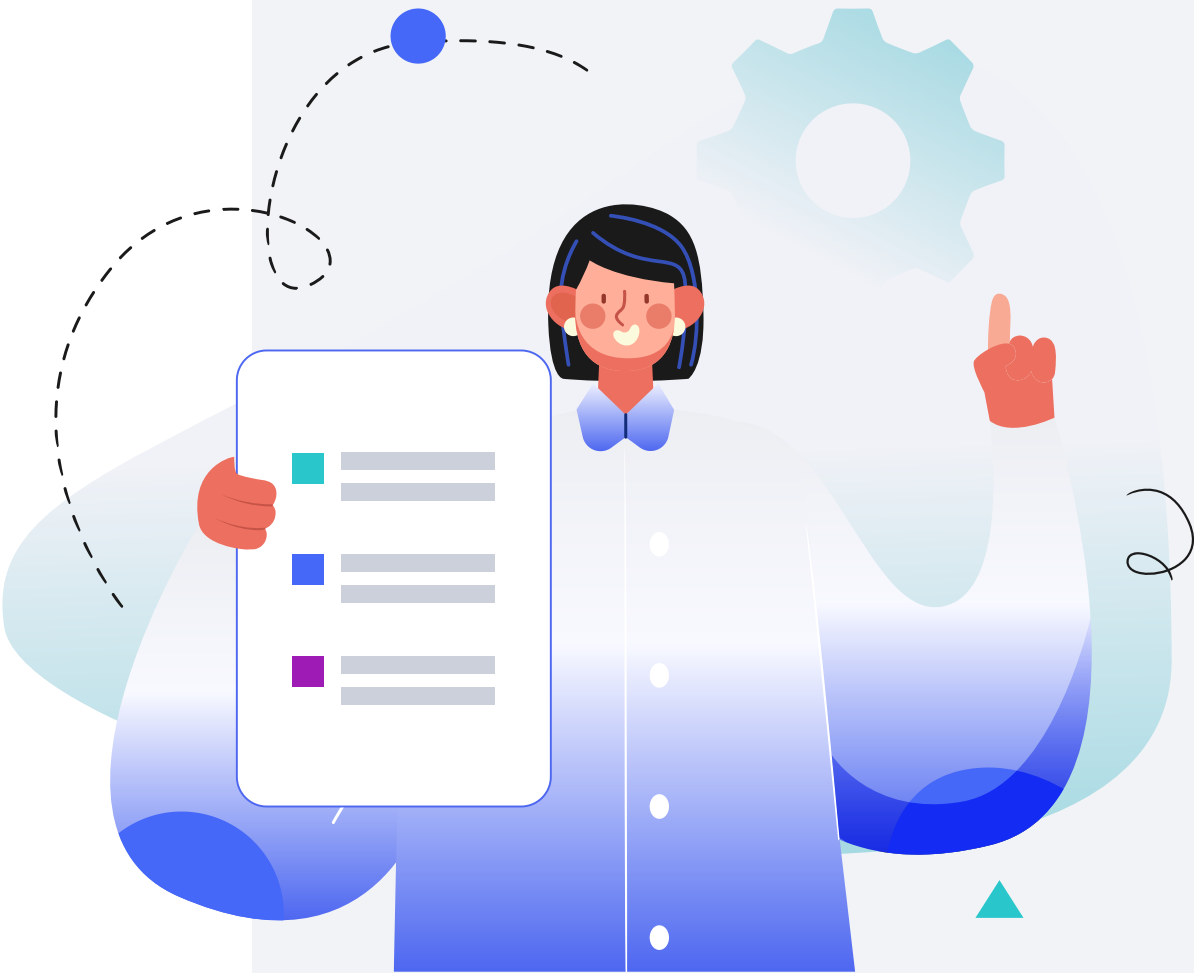
Male

HEIGHT

5ft 5" 165cm

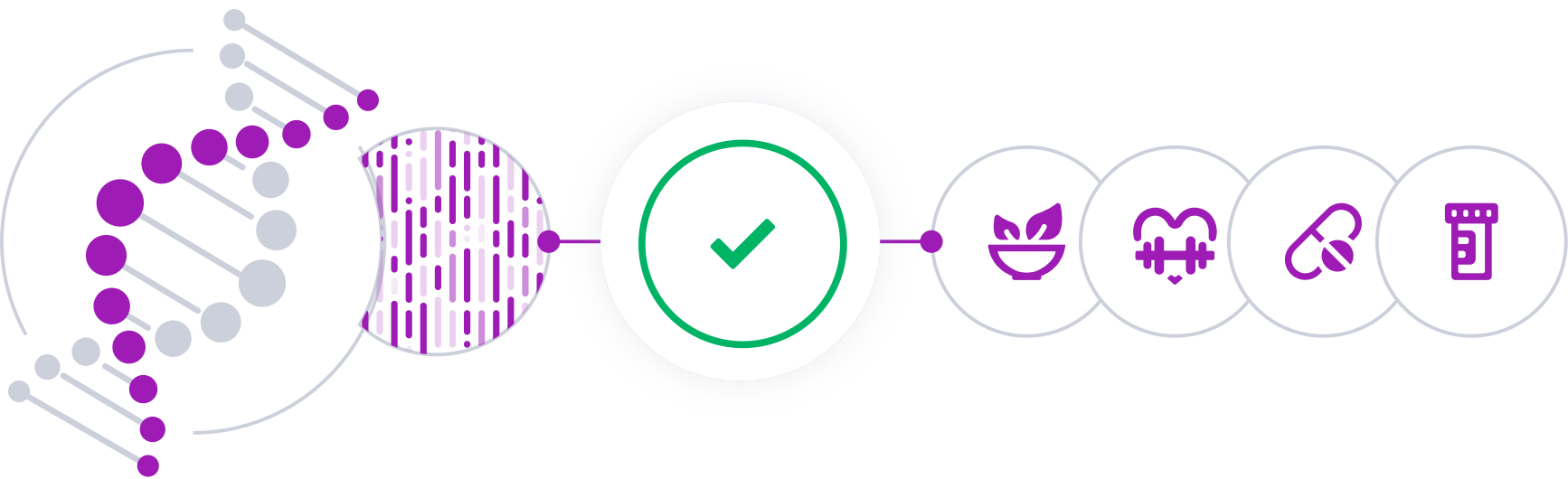
WEIGHT

137lb 62kg



How this works

Our Wellness Reports analyze how your DNA influences your health.
We then use this analysis to give you personalized risk estimates and recommendations.

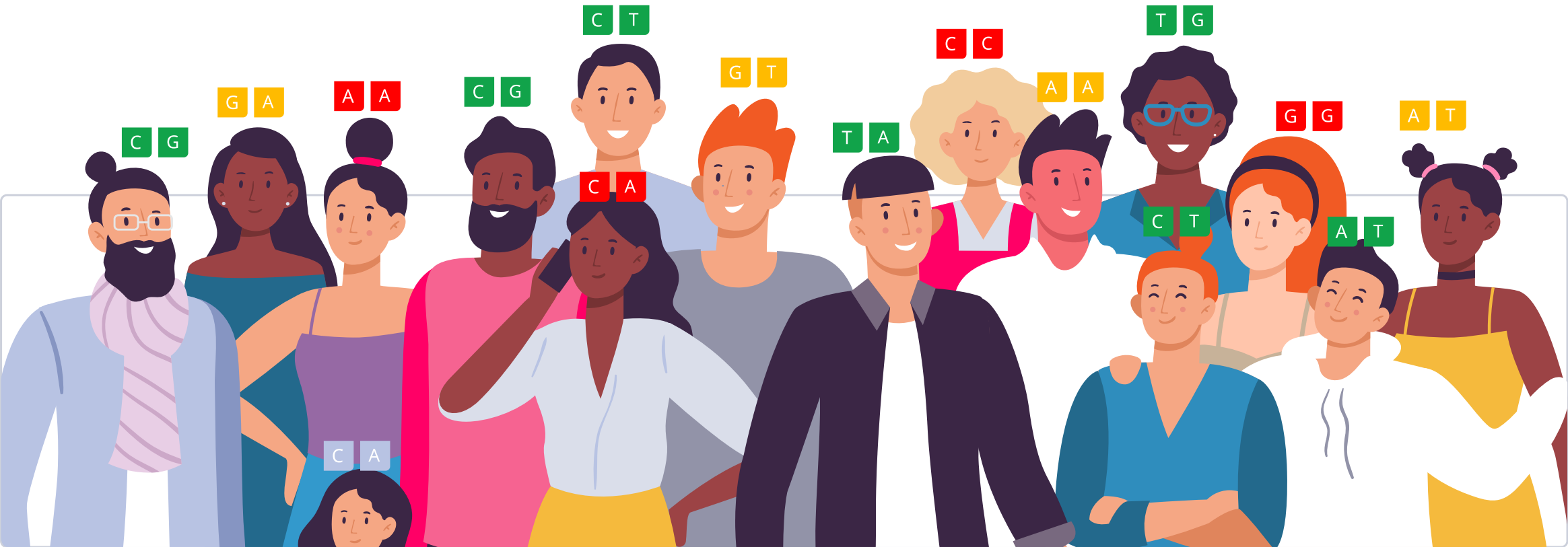


Similarly, our Trait Reports look at how your DNA influences your traits.



Your DNA is like an instruction manual — it contains a lot of information.
You can think of it as a blueprint for your body.

Genetic variants are parts of DNA that differ from person to person. Some can make you more vulnerable to certain health issues, while others may influence traits such as eye color.



We use artificial intelligence and machine learning to analyze all this information.
We then summarize your results as a risk score or display it on a gauge.

In total, we analyze up to 83 million genetic variants.

When we give a risk score, the risk icon tells you if you are at a higher or lower risk compared to other people:



Genotype color info:

AA

You don't have any risk alleles

AA

You have 1 risk allele

AA

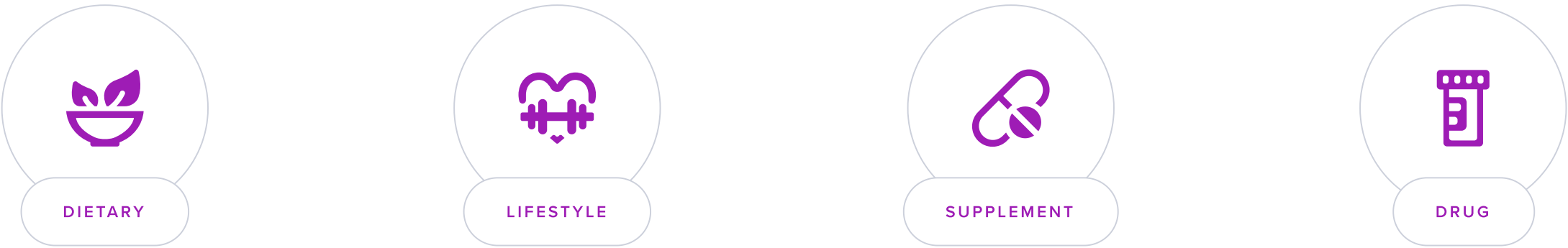
You have 2 risk alleles

Your risk is also displayed as a percentile. This will tell you how your risks compare to our sample population. The lower your percentile number, the lower your risk. The "50th percentile" would be an average risk.

Similarly, the gauge tells you your relative risk score compared to our sample population, or it indicates a specific trait or haplotype you are more likely to have based on your genetic variants.

When applicable, we also list top evidence-based recommendations that may help lower your risk. The focus is on recommendations that may be of benefit to you, based on your genetics.

Our recommendations come in four categories: lifestyle, diet, supplements and drugs.
The following icons tell you which category a recommendation falls into:



Our team of scientists also ranks each recommendation.
We rank based on impact and the strength of evidence in the medical literature.

Impact shows how strongly a recommendation will affect your health in a certain area.
Evidence is how much scientific support there is for the recommendation. Rankings are from 1 to 5 (low to high):



Impact

Impact scores range from 1-5. These scores reflect how much of an effect each recommendation can have. An impact score of 5 predicts the biggest effect.

When a recommendation affects something we can measure, we use those measurements to assign the impact score. For example, a recommendation that decreases cholesterol by 20% will have a higher impact score than one that decreases it by 5%.

Some recommendations affect things that we cannot directly measure, like stress or mood. For these, the impact score is based on how well they work relative to other recommendations and standard treatments. The best ones get the highest scores.

If there is a lot of research that shows a recommendation works especially well for your genotype, the impact score gets increased.

Recommendation Evidence

- 5 / 5
- Recommendations that are considered effective and generally recommended by experts and medical bodies.
-
- 4 / 5
- Recommendations that are considered likely effective and that have multiple independent meta-analyses and a great many studies supporting them.
-
- 3 / 5
- Recommendations that are considered possibly effective and have many studies supporting them
-
- 2 / 5
- Recommendations that have insufficient evidence, with two or several clinical trials supporting them, or many studies but with ambiguous results.
-
- 1 / 5
- Recommendations that have insufficient evidence, with a single clinical trial, or with many studies most of which didn't find support for the recommendation.
-
- 0 / 5
- No evidence in humans.

Genotype-specific Evidence

- High-quality
- Direct evidence that a recommendation helps more in people with your gene variant (many clinical trials, a few large clinical trials, or a meta-analysis).
-
- Medium-quality
- Direct evidence that a recommendation helps more in people with your gene variant (a few clinical trials or one large clinical trial).
-
- Low-quality
- Direct evidence that a recommendation helps more in people with your gene variant (a single clinical trial or more trials with inconsistent results).
-
- Indirect
- A recommendation may help more in people with your gene variant because it targets a specific gene or protein affected by your variant (e.g., MTHFR, dopamine).
-
- In theory
- A recommendation may help more in people with your gene variant because it targets a specific mechanism affected by your variant (e.g., inflammation, oxidative stress).

Some things to keep in mind:

- Genetics doesn’t play a considerable role in a condition or a trait.
- There is not enough research available to estimate a genetic predisposition.
- There are technical limitations to estimating or presenting a genetic predisposition.
- The topic is sensitive, and a genetic predisposition should only be estimated and presented by a healthcare professional.

Introduction

When you eat, your digestive system breaks down carbohydrates into [glucose](#) (sugar). The rise in blood sugar stimulates the pancreas to produce [insulin](#) to signal an abundance of energy in the body [\[R\]](#).

Insulin increases the uptake and storage of sugar in muscles and fat cells for energy production, which lowers blood sugar levels. Insulin also moves sugar into the liver, where it is stored as a source of energy [\[R\]](#), [\[R\]](#), [\[R\]](#).

Under some circumstances, the pancreas produces enough insulin, but the target cells do not get the message. **This condition is called insulin resistance** [\[R\]](#), [\[R\]](#).

Studies estimate that **up to 50%** of people worldwide may be insulin resistant [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

About Insulin Resistance

Insulin resistance is the reduction of the body’s ability to control blood sugar levels. It happens when the muscles, liver, and fat cells no longer respond to insulin and have trouble taking sugar up [R].

In response, the pancreas is forced to produce more insulin than normal to keep blood sugar in balance. Hence, people with insulin resistance may have high insulin levels. Blood sugar levels may also rise eventually, paving the way for diabetes [R, R].

Homeostatic model assessment (HOMA-IR) helps measure insulin resistance. It is calculated using your fasting glucose and fasting insulin. The higher your HOMA-IR, the more insulin resistant you are [R, R].

Insulin resistance is commonly caused by two factors: **overeating and lack of physical activity**. These can cause a buildup of fat in the liver and muscles that lead to insulin resistance [R, R, R].

Insulin resistance is associated with overweight and obesity, especially due to the accumulation of belly fat. However, normal-weight people may also have insulin resistance. Other health conditions may also lead to insulin resistance, including [R]:

- Sleep apnea [R]
- Thyroid disorders [R, R, R]
- Polycystic ovary syndrome (PCOS) [R, R]
- Pancreas disease [R, R]
- Acromegaly (too much growth hormone) [R]
- Cushing’s syndrome (excess of cortisol) [R]
- Rare genetic diseases [R, R, R, R]

Keep in mind that this report is not about the rare genetic disorders mentioned above. They are very rare and usually diagnosed in infancy.

The risk of insulin resistance may also increase due to:

- Aging [R, R]
- Stress [R, R]
- Fasting [R, R, R]



TYPICAL

Predisposed to typical insulin resistance based on 2,426 genetic variants we looked at

43rd

PERCENTILE



Your risk is greater than 43% of the population and lower than 57% of the population.

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
GAS1	rs9792548	AA
PPARG	rs1801282	CC
IRS1	rs2943641	TC
PPARG	rs3856806	CC
FOXO3	rs13217795	TT
FOXO3	rs2802288	AA
IGF1	rs35767	GG
NAT2	rs1208	AA
TIMP4	rs13081389	AA
KLHL2	rs17046216	AA
LEPR	rs1137101	AG
MRPS31	rs4581585	CC
ZC3H12C	rs475338	AA
FBXO21	rs2036313	GG
HAPLN1	rs1457105	CC
/	rs12969333	AA
DAAM2	rs4345393	GG
ME1	rs11967452	CC
KCNK17	rs10456469	GG
ORMDL3	rs939345	CC
ZIC2	rs7338383	GG
CSNK2A1	rs6053042	CC
RAB28	rs1197712	AA
ATP8B1	rs10439020	AA

- Western diet [\[R\]](#)
- Too little sleep [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Pregnancy [\[R\]](#)
- Exposure to toxins (e.g., herbicides) [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Some drugs (e.g., corticosteroids) [\[R\]](#), [\[R\]](#)

Genetics also influences insulin resistance. Up to **65%** of differences in people’s insulin resistance may be due to genetics [\[R\]](#), [\[R\]](#).

Insulin resistance may increase the risk of:

- Diabetes
- Liver disease
- Metabolic syndrome

Interestingly, insulin resistance may occur up to 15 years before diabetes develops. Read [this post](#) for a detailed list of tips to reduce insulin resistance [\[R\]](#).

GENE	SNP	GENOTYPE
MPC1	rs2281056	AA
MROH8	rs11698899	GG
RUNX3	rs803323	AA
TLR4	rs13290714	CC
SORCS1	rs7088188	CT
MDGA1	rs17589516	AA
CACNA1D	rs1401492	CC
SLC10A2	rs16962638	AA
ATP10A	rs6576507	TT
/	rs7043482	AC
CSMD1	rs2407314	CC
FTO	rs9939609	TT
TCERG1L	rs7077836	GG
ADRB3	rs4994	AA
FABP2	rs1799883	CC
FTO	rs1421085	TT
FTO	rs1121980	GG
BRD1	rs13057821	CC
KL	rs9535766	TT
UBR1	rs17776090	AA
BMP8A	rs710912	CC
/	rs2873975	GG
POLL	rs3730464	AA
RUNX1	rs17227476	GG
NINL	rs11698267	GG
FAM135B	rs10088248	CC

The number of "risk" variants in this table doesn't necessarily reflect your overall result.

Your Recommendations

Your recommendations are prioritized according to the likelihood of it having an impact for you based on your genetics, along with the amount of scientific evidence supporting the recommendation.

You’ll likely find common healthy recommendations at the top of the list because they are often the most impactful and most researched.

DOSAGE		DOSAGE	
1	Avoid Sugary Foods & Drinks	2	Exercise At Least One Hour a Day1 hour
3	Eat Fiber-Rich Foods	4	Zinc10 mg
5	Avoid Organochlorine Pesticide Exposure	6	Yoga30 minutes
7	Pistachios	8	Strength Training1 hour
9	American Ginseng200 mg	10	Relaxation Techniques30 minutes
11	Sleep for 7+ Hours	12	Magnesium250 mg
13	Avoid Endocrine Disruptors	14	Behavioral Sleep Extension
15	Artichoke	16	Berberine500 mg
17	Barberry and Milk Thistle	18	Probiotics10 billion
19	Kefir	20	Resistant Starch40 g Hi-Maize
21	Cinnamon500 mg	22	Vanadium
23	Maintain Optimal Vitamin D Levels1000 iu	24	Resveratrol150 mg
25	Avoid Phthalate Exposure	26	L-Carnitine500 mg
27	Curcumin500 mg	28	Soy Isoflavones40 mg
29	Genistein30 mg	30	Avoid Air Pollution
31	Walking30 minutes	32	Alpha-Lipoic Acid100 mg

33	Magnesium Chloride	200 mg	34	Broccoli Sprouts	2 tbsp
35	Myo-inositol	4 g	36	Cardamom	500 mg
37	Acupuncture	1 hour	38	Vinegar	
39	Artemisia Extract	200 mg	40	Dill	
41	Mediterranean Diet		42	Yacon	
43	Inositol	2 g	44	Kimchi	
45	Breathing Techniques	10 minutes	46	Avoid Perchlorate	
47	Wormwood	200 mg	48	Tocotrienols	100 mg
49	Spinach		50	Chickpeas	
51	Grapes		52	Cumin	500 mg
53	Taurine	500 mg	54	Intermittent Fasting	
55	Orange Juice		56	Jiaogulan (Gynostemma Pentaphyllum)	1350 mg
57	Beta-Alanine	2 g	58	Amaranth	
59	Lactobacillus Acidophilus	10 billion CFU	60	Akkermansia	
61	Pecans		62	Sulforaphane	30 mg
63	L-Citrulline	3 g	64	Mangosteen	500 mg
65	Lactobacillus Casei	10 billion CFU	66	Neem	300 mg
67	Blackberries		68	Bergamot	
69	Saccharomyces Boulardii	10 billion CFU	70	Cupping Therapy	15 minutes
71	Ecklonia Cava	100 mg	72	Mangiferin	150 mg

73	Bifidobacterium Breve	10 billion CFU	74	Iyengar Yoga	1 hour
75	Circadian Rhythm Alignment		76	Syrian Rhubarb (Rheum Ribes)	200 mg
77	CLA (Conjugated Linoleic Acid)	3 g	78	Gentle Yoga	20 minutes
79	Buckwheat		80	Ursolic Acid	150 mg
81	Fasting Mimicking Diet		82	Bifidobacterium Longum	10 billion CFU
83	Glutathione supplements		84	Olive Leaf Extract	500 mg
85	Lactobacillus Acidophilus NCFM	10 billion CFU	86	Chamomile	300 mg
87	Chlorella	3 g	88	Fucoidan	300 mg
89	Eriocitrin	500 mg	90	Brown Seaweed And Bladderwrack	500 mg
91	Eccentric Exercise		92	TUDCA (Tauroursodeoxycholic Acid)	250 mg
93	Berries		94	Aerobic Exercise (Cardio)	1 hour
95	Low-Carbohydrate Diet		96	Barberry	500 mg
97	Green Tea	400 mg	98	Yerba Mate	1 g
99	Whey Protein	25 g	100	L-Lysine	1000 mg
101	Practice Exercise Snacks	1 minutesute	102	Ginkgo	120 mg
103	Blueberries		104	Aloe Vera	50 mg
105	Chia Seeds		106	Chromium	200 mcg
107	Regular Sleep Schedule		108	Legumes	
109	Spirulina	500 mg	110	Dietary Vitamin A	
111	Histidine	500 mg	112	Dietary Vitamin E	

113	Bladderwrack	300 mg	114	Melatonin	500 mcg
115	Brown rice		116	Dietary Omega-3 Fatty Acids	
117	Coenzyme Q10 (CoQ10)	100 mg	118	Garlic	
119	Ascophyllum Nodosum	100 mg	120	Green Tea Extract	250 mg
121	Avocado		122	Quinoa	
123	Ginger	500 mg	124	Flaxseed	2 tbsp
125	Almonds		126	Whole Grains	
127	Good Oral Hygiene	2 minutes	128	Bilberry	
129	Fenugreek	500 mg	130	Paleo Diet	
131	Vegetables		132	Meditation	30 minutes
133	Goji Berries		134	Carob	5 g
135	Keto Diet		136	Broccoli	
137	Dietary Magnesium		138	Psyllium	5 g
139	Aquatic Exercise	1 hour	140	Brown Seaweed	500 mg
141	Apple Cider Vinegar		142	Bitter Melon Supplement	500 mg
143	Extra Virgin Olive Oil (EVOO)		144	Limit Calorie Intake	
145	Milk Thistle (Silymarin)	300 mg	146	Caper Fruit Extract	400 mg

1



Avoid Sugary Foods & Drinks

IMPACT

5 / 5

EVIDENCE

5 / 5

How to implement

To avoid sugary foods, eliminate or significantly reduce consumption of foods and beverages high in added sugars such as sodas, candies, baked goods, and sugary cereals from your diet. Instead, opt for natural sugar sources like fruits. Aim to do this daily for ongoing health benefits.

Description

High-sugar foods like baked goods, sweets, and sugary drinks, can spike your blood sugar levels. Consuming a lot of these types of foods can contribute to health issues like diabetes, obesity, insomnia, and heart disease.

High-sugar foods and refined carbs have a high glycemic index (GI). This means they tend to spike your blood sugar levels. They include [R](#), [R](#), [R](#):

- Sugary drinks
- Baked goods
- Sweets
- White bread
- White rice
- Pasta

Eating a lot of sugary foods can contribute to:

- Diabetes [R](#), [R](#), [R](#)
- Weight gain and obesity [R](#), [R](#)
- Insomnia [R](#)
- Heart disease [R](#)

You may also want to avoid processed sugars and sugary drinks. They may have a role in increasing IL-1B [R](#), [R](#).

How it helps

Sugary foods can spike your blood sugar and insulin. **Over time, this can lead to insulin resistance and increase the risk of type 2 diabetes** [R](#), [R](#), [R](#), [R](#).

All health experts recommend avoiding sugary foods for people with poor blood glucose control [R](#), [R](#), [R](#).

Diets that limit sugary foods and help reduce insulin resistance include:

- The [Mediterranean diet](#) [R](#), [R](#), [R](#)
- The [keto diet](#) [R](#)
- The Paleo diet [R](#)

2



Exercise At Least One Hour a Day

IMPACT

4 / 5

EVIDENCE

5 / 5

How to implement

Dedicate a minimum of 60 minutes to moderate-intensity activities such as brisk walking, swimming, or cycling. Do this most days of the week, aiming for at least 5 days to optimize benefits.

TYPICAL STARTING DOSE

1 hour

Description

[Exercise](#) can do wonders for your health. It can help you lose weight, improve your heart health, boost your mood, and more [\[R\]](#).

There are many ways you can be active. You can walk, run, swim, dance, or play team sports. **Everything counts, and it's never too late to start!**

Try to get at least **60 minutes of moderate physical activity on most days**, including walking. **Getting a mix of cardio (min 150 min/day) and strength training (min 2 times a week) may be optimal.**

How it helps

Exercise is a great way to control blood sugar levels. When you exercise, your muscles use up sugar for energy. Exercise also makes your cells more sensitive to insulin [\[R, R, R, R, R\]](#).

Try a mix of cardio and strength training for at least 150 min/week [\[R, R, R\]](#).

All health experts recommend exercise to improve insulin resistance and blood glucose control. However, you may need to combine it with diet for optimal results [\[R, R, R, R, R\]](#).

3



Eat Fiber-Rich Foods

IMPACT

4 / 5

EVIDENCE

4 / 5

How to implement

Incorporate foods high in fiber, such as fruits, vegetables, whole grains, and legumes, into your daily meals. Aim for a total dietary fiber intake of 25 to 30 grams per day, spread out over all meals.

Description

Fiber is a type of carb that your body can’t digest which supports digestion, heart health, and blood sugar control. You can get fiber by eating things like whole grains, fruits, nuts, seeds, and leafy greens.

Fiber is a type of carb that your body can’t digest. It supports digestion, heart health, blood sugar control, and more [\[R, R\]](#).

Adults should get 28 g of fiber every day. Most people in the US don’t get enough fiber [\[R, R\]](#).

You can get more fiber by eating [\[R, R\]](#):

- Whole grains
- Fruits
- Leafy greens
- Nuts and seeds
- Beans
- Broccoli

Fiber supplements, such as [psyllium husk](#), are available for people who don’t get enough fiber from their diets [\[R, R\]](#).

How it helps

Dietary fiber may help reduce insulin resistance. People who eat more fiber may also be at a lower risk of diabetes [\[R, R, R\]](#).

[Mediterranean](#) and vegetarian diets are rich in high-fiber foods that may help reduce insulin resistance [\[R, R, R\]](#).

High-fiber foods that may benefit insulin sensitivity include:

- [Flaxseed](#) [\[R, R, R\]](#)
- [Fenugreek](#) [\[R, R, R\]](#)

For people who don’t get enough fiber from diet, potential supplements include:

- [Resistant starch](#) [\[R, R, R\]](#)
- [Inulin](#) [\[R, R, R\]](#)

Note that a diet high in sugary foods may cancel out the protective effects of dietary fiber [\[R\]](#).

4



Zinc

IMPACT

4 / 5

EVIDENCE

3 / 5

How to implement

Take a 15 mg zinc supplement daily, ideally with a meal to enhance absorption.

TYPICAL STARTING DOSE

10 mg

Description

Zinc is an essential mineral found in various foods, including meat, dairy, and nuts. It is crucial for immune function, wound healing, DNA synthesis, and maintaining healthy skin and nails. Zinc supplements are sometimes used to support immune health and manage zinc deficiencies.

[Zinc](#) is an essential mineral. Your body needs it to [\[R\]](#), [\[R\]](#):

- Defend against disease
- Protect DNA from damage
- Heal wounds
- Control blood sugar

Some of the best sources of zinc include **shellfish, pork, beef, and beans**. It is also available as a supplement [\[R\]](#).

Adults should get **8-11 mg of zinc** per day [\[R\]](#).

How it helps

In some people, the pancreas produces too much insulin, which can lead to insulin resistance. **Zinc may be able to prevent this and protect the pancreas from damage** [\[R\]](#), [\[R\]](#).

Zinc-deficient people are more likely to have insulin resistance if they are overweight or obese [\[R\]](#).

Supplementing with zinc (25-34 mg/day) may reduce insulin resistance. It may also lower the odds of type 2 diabetes [\[R\]](#), [\[R\]](#), [\[R\]](#).

5

Avoid Organochlorine Pesticide Exposure

IMPACT

3 / 5

EVIDENCE

4 / 5

How to implement

Minimize exposure by choosing organic fruits and vegetables, thoroughly washing produce before consumption, and avoiding areas where organochlorine pesticides are applied. Consider using air purifiers in homes close to agricultural areas to reduce indoor pesticide levels.

Description

Reducing organochlorine pesticide exposure involves minimizing contact with pesticides like DDT, which can accumulate in the body and potentially lead to adverse health effects, including disruption of hormonal functions and carcinogenicity.

How it helps

Reducing exposure to organochlorine pesticides can help manage insulin resistance because these chemicals can interfere with your body's ability to regulate blood sugar, thus worsening insulin resistance. Lower levels of exposure may also improve your body's insulin sensitivity, making it easier for your body to process glucose.

A [meta-analysis of 22 studies](#) identified organochlorines such as **DDT, heptachlor, HCB, DDT, and trans-nonachlor or chlordane as pesticides increasing the risk of type 2 diabetes** [\[R\]](#).

[Two meta-analyses \(the largest one with 23 studies\)](#) associated exposure to **p,p'-DDE with 33-44% higher risk of type 2 diabetes, but not gestational diabetes** [\[R, R\]](#).

Another [meta-analysis \(43 studies\)](#) found that **DDT exposure increases the risk of type 2 diabetes by 61%, while DDE increases it by 67%**. The association was **strongest in Asian populations** [\[R\]](#).

A [meta-analysis of 41 studies](#) associated high exposure to chlorinated pesticides with **2-fold higher risk of type 2 diabetes** [\[R\]](#).

A [meta-analysis of 12 studies and 6789 participants](#) concluded that exposure to **hexachlorocyclohexane increases their risk of metabolic syndrome by 36%, while transnonchlor increases it by 25%** [\[R\]](#).

Another [meta-analysis \(7 studies\)](#) associated exposure to **oxychlordane with 96% higher risk of type 2 diabetes, trans-nonachlor with a 143% higher risk, and heptachlor epoxide with 88% higher risk** [\[R\]](#).

A [study of 749 non-diabetic participants](#) found a **strong association between organochlorines and insulin resistance** [\[R\]](#).

6



Yoga

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Practice yoga for at least 20 to 30 minutes a day, most days of the week. Choose a style that matches your fitness level and goals, and consider attending a class or using online resources to guide your practice.

TYPICAL STARTING DOSE

30 minutes

Description

Yoga is a mind-body practice that combines physical postures, breathing exercises, and meditation. It enhances flexibility, strength, and mental well-being and is used for stress reduction, relaxation, and overall health improvement.

[Yoga](#) combines breathing, stretching, and relaxation techniques. Practicing yoga may help [\[R, R, R\]](#):

- Reduce [stress](#)
- Improve fitness
- Lower blood pressure and heart rate
- Manage pain

How it helps

Stress releases chemicals that are linked to insulin resistance and high blood sugar levels. **Stress from work in particular may increase insulin resistance** [\[R, R, R, R\]](#).

Yoga, which calms you down by combining breathing, stretching, and meditation, may help improve insulin resistance, fasting glucose, and HbA1c [\[R, R\]](#).

7



Pistachios

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Incorporate a handful of pistachios (about 1-2 ounces) into your daily diet. You can add them to your breakfast cereals, salads, or simply snack on them throughout the day. Do this regularly for ongoing heart health benefits and to aid in maintaining a balanced diet.

Description

Pistachios are a type of nut native to Asia but grown extensively in the Mediterranean. They are packed with healthy fats, fiber, protein, and various vitamins and minerals, like vitamins C, B6, and E, as well as potassium, copper, and iron. They are also rich in antioxidant and anti-inflammatory compounds, which can help lower cholesterol levels and support weight management.

The pistachio (*Pistacia vera L*), known as **the “green nut”**, is a nut native to Asia but widely cultivated in the Mediterranean. Pistachios have **low fat content** and high levels of [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Unsaturated fats
- Vitamins (C, B6, E, K, thiamin)
- Minerals (Potassium, copper, iron, and magnesium)

Pistachios also have a high **antioxidant and anti-inflammatory** effect [\[R\]](#).

How it helps

Pistachios are rich in healthy fats, fiber, and antioxidants, which regulate blood sugar and enhance insulin sensitivity. Therefore, they can help manage and treat insulin resistance by improving your body's ability to use insulin.

Four meta-analyses (the largest one with 17 studies) concluded that consuming pistachios lowers fasting glucose (by 3.62-5.32 mg/dL), insulin (by 1.86 µIU/mL), insulin resistance, and HbA1c. However, the results were mixed for insulin resistance and HbA1c [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

8

Strength Training

IMPACT3 / 5

EVIDENCE3 / 5

How to implement

Engage in strength training exercises, such as weight lifting or bodyweight exercises, for 60 minutes per session, 2 to 3 times per week. Ensure you work all major muscle groups and rest each muscle group for at least 48 hours before exercising it again.

TYPICAL STARTING DOSE

1 hour

Description

Strength training, also called resistance or *anaerobic* training, contracts the muscles against an external resistance for short periods of time. This helps gain muscle strength, tone, and mass. This can include activities like weight lifting, pushups, and crunches.

Strength training, also known as resistance training, is a type of physical exercise that uses resistance to build strength, anaerobic endurance, and size [R]. Some of the most common strength training methods include [R]:

- Weight lifting
- Bodyweight exercises like push-ups, pull-ups, squats, and lunges.
- Resistance bands
- Plyometrics or explosive force exercises

The benefits of strength training are numerous, and include [R]:

- Increased muscle strength
- Improved bone health
- Reduced risk of injury
- Improved balance and coordination
- Enhanced mood
- Boost metabolism

Consult with a doctor before starting any new exercise program, especially if you have any health conditions.

How it helps

Strength training improves insulin resistance by aiding muscle cells in using blood sugar more efficiently. Regular practice increases muscle strength and size, thereby reducing excess glucose, which limits the need for insulin.

Exercise is a great way to control blood sugar levels. When you exercise, your muscles use up sugar for energy. Exercise also makes your cells more sensitive to insulin [R, R, R, R, R].

All health experts recommend exercise to improve insulin resistance and blood glucose control. However, you may need to combine it with diet for optimal results [R, R, R, R, R].

Strength training is beneficial for insulin resistance, but young people may need to combine it with cardio [R].

9



American Ginseng

IMPACT3 / 5

EVIDENCE3 / 5

How to implement

Take 200-400 mg of American ginseng extract daily, preferably with a meal to enhance absorption. This regimen can be followed continuously for up to 12 weeks, after which a break or reassessment of the need to continue should be considered.

TYPICAL STARTING DOSE

200 mg

Description

American ginseng is a perennial herb native to North America, particularly regions of the United States and Canada. It is valued for its potential health benefits, including immune system support, stress reduction, and enhanced cognitive function, with the primary active compounds being ginsenosides.

[Ginseng](#) is a plant people use to improve [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Sexual function
- Immunity
- Fatigue
- Attention

There are many different types of ginseng. The most common ones are [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Korean red ginseng, also called Asian ginseng (*Panax ginseng*)
- [American ginseng](#) (*Panax quinquefolius*)
- Chinese notoginseng, also called Sanchi (*Panax notoginseng*)

How it helps

A study explored the impact of American ginseng supplementation on biomarkers of glucose tolerance and oxidative stress in type 2 diabetic subjects. The results indicated a significant decrease in insulin resistance and fasting plasma glucose after ginseng treatment [\[R\]](#).

Another study assessed the ginseng-induced improvement in glucose control and insulin sensitivity in patients with type-2 diabetes or impaired glucose tolerance. Ginseng supplementation improved fasting glucose, postprandial insulin, and HOMA-IR levels [\[R\]](#).

A review and meta-analysis focused on the glycemic effects of ginseng in people with and without diabetes. The study found that ginseng significantly reduced fasting blood glucose, indicating a modest yet significant impact on glycemic control [\[R\]](#).

10



Relaxation Techniques

IMPACT3 / 5

EVIDENCE3 / 5

How to implement

Incorporate relaxation techniques such as deep breathing exercises, meditation, or yoga into your daily routine. Spend at least 15-30 minutes each day practicing one of these techniques, preferably in a quiet, comfortable space without interruptions.

TYPICAL STARTING DOSE

30 minutes

Description

Relaxation techniques encompass various methods like deep breathing, yoga, meditation, and progressive muscle relaxation, aimed at reducing stress and promoting mental and physical relaxation. Practicing these techniques regularly can help manage stress, improve mental clarity, and enhance overall emotional well-being.

We all get stressed from time to time.

[Stress](#) can help you deal with a challenge or avoid danger. However, **it’s not healthy to be stressed for a long time** [\[R, R\]](#).

Relaxation techniques such as [yoga](#) and [meditation](#) can relieve stress in different ways. Most of them focus on breathing and help you get rid of negative thoughts and emotions [\[R\]](#).

People use relaxation techniques to improve conditions like [\[R, R, R\]](#):

- Anxiety
- Depression
- Chronic pain

Progressive muscle relaxation is another relaxation technique. In this technique, you focus on tensing and relaxing different parts of your body. It is common to start with the toes and slowly work your way up to the neck and head [\[R, R\]](#).

Autogenic training is a relaxation technique that a person may carry out on their own. It uses exercises that take the mind’s attention to bodily sensations such as warmth and heaviness [\[R, R\]](#).

How it helps

Stress releases chemicals that are linked to insulin resistance and high blood sugar levels. **Stress from work in particular may increase insulin resistance** [\[R, R, R, R\]](#).

Relaxation techniques that may reduce insulin resistance and balance blood sugar include:

- **Meditation:** helps you clear the mind and be aware of the present moment [\[R\]](#)
- **Yoga:** helps calm you down by combining breathing, stretching, and meditation [\[R, R\]](#)

11



Sleep for 7+ Hours

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Ensure you allocate enough time in your schedule to achieve a minimum of 7 hours of sleep each night. This might involve going to bed earlier or adjusting your evening routine to promote relaxation and make it easier to fall asleep.

Description

Optimizing sleep involves adopting healthy sleep habits and creating a sleep-conducive environment to ensure restorative and sufficient sleep duration. It supports cognitive function, mood stability, and overall physical health. Most experts recommend getting **at least 7 hours of good-quality sleep each night**.

[Sleep](#) supports your body and mind [\[R, R\]](#). More precisely, sleep helps:

- Support brain health [\[R, R\]](#)
- Maintain a healthy weight and appetite [\[R, R, R\]](#)
- Regulate blood pressure [\[R, R\]](#)
- Balance blood sugar [\[R, R\]](#)

Ways to sleep better include [\[R\]](#):

- Reducing your bright light exposure (screen time) in the evenings
- Sticking to a regular sleep schedule
- Avoiding hunger or large meals before bed
- Avoiding nicotine, caffeine, and alcohol before bed
- Maintaining a sleep area that’s cool, dark, and quiet

How it helps

Poor sleep can alter [\[R, R\]](#):

- Your appetite
- Food cravings
- Sugar metabolism
- Insulin sensitivity

Getting insufficient sleep may increase blood sugar levels and cause insulin resistance in the long run. Interventions improving sleep duration may help with insulin resistance [\[R, R, R\]](#).

People who work in shifts may also be at increased risk of insulin resistance [\[R\]](#).

12



Magnesium

IMPACT3 / 5

EVIDENCE3 / 5

How to implement

Take up to 350 mg of magnesium daily as a supplement, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

250 mg

Description

Magnesium is an essential mineral involved in various bodily functions, including muscle contractions, nerve signaling, and bone health. Maintaining adequate magnesium levels through diet or supplements can support overall well-being and reduce the risk of magnesium deficiency-related health issues.

[Magnesium](#) is an essential mineral. Your body needs it for [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Muscle, nerve, and bone function
- Blood sugar and blood pressure control
- DNA and protein production
- Strong immunity

Women need **310-320 mg** of magnesium per day, while men need **400-420 mg** [\[R\]](#).

Foods rich in magnesium include **nuts, seeds, and leafy greens**. Magnesium is also available as a supplement [\[R\]](#).

How it helps

Magnesium may help control blood sugar by supporting the effects of insulin. **Higher magnesium intake is linked to lower blood sugar and insulin resistance** [\[R\]](#), [\[R\]](#).

Supplementing with magnesium (250-350 mg/day for 4-16 weeks) may lower insulin resistance and blood sugar levels. It may help both people with diabetes and those at risk of this condition [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

13



Avoid Endocrine Disruptors

IMPACT3 / 5

EVIDENCE3 / 5

How to implement

Minimize exposure to endocrine disruptors by opting for organic foods to reduce pesticide intake, using glass or stainless steel instead of plastic containers for food and beverages, avoiding cosmetics and personal care products with parabens or phthalates, and regularly vacuuming and dusting your home to reduce contact with flame retardants found in household dust.

Description

Avoiding exposure to endocrine disruptors, such as certain chemicals found in plastics and pesticides, is crucial for maintaining hormonal balance and reducing the risk of hormone-related health problems.

Endocrine disruptors are chemicals that interfere with the body’s hormone (endocrine) system by [R](#), [R](#):

- Blocking the function or activity of hormones
- Mimicking the function of hormones

Based on limited studies, long-term exposure to these chemicals can have negative effects on health [R](#), [R](#).

Endocrine disruptors can be found in cosmetics, food products, pesticides, and other common household items [R](#).

How it helps

Exposure to endocrine disruptors is linked to an increased risk of diabetes and insulin resistance. Chemicals that may play a role include [R](#), [R](#), [R](#), [R](#), [R](#), [R](#):

- Compounds added to plastics (phthalates, BPA)
- Pesticides (organochlorines)

Some tips to avoid these chemicals include:

- Washing your hands, especially before eating
- Washing your fruits and vegetables
- Buying organic foods whenever possible
- Dusting and vacuuming regularly
- Reducing the use of certain plastics and cosmetics

14



Behavioral Sleep Extension

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

To implement behavioral sleep extension, aim to increase your total sleep time by going to bed 15 to 30 minutes earlier than your usual bedtime, or by allowing yourself to sleep later in the morning. Gradually increase this time as needed to reach a target of 7 to 9 hours of sleep per night, consistently, including on weekends. Adjust your daily schedule to accommodate this change, making sleep a priority.

Description

Behavioral sleep extension involves adopting healthier sleep habits to extend the duration and improve the quality of sleep. It can lead to improved cognitive function, mood, and overall well-being by addressing sleep deficiency.

How it helps

Behavioral sleep extension aids in normalizing your body's insulin sensitivity, essentially helping your cells better respond to insulin. More sleep means better blood sugar control, reducing the effects of insulin resistance.

A systematic review of 7 studies and 138 participants concluded that behavioral sleep extension interventions improve direct and indirect measures of insulin sensitivity. In a non-placebo-controlled trial of 18 overweight or obese men not included in the meta-analyses, a 6-week sleep extension intervention lowered fasting insulin (by 18.10 pmol/L), mean amplitude of glucose excursions (by 0.39 mmol/L), and insulin resistance. Similarly, sleep extension to over 6 h/night for 2 weeks improved insulin resistance, early insulin secretion, and β -cell function in a non-placebo-controlled trial of 21 chronically sleep-deprived participants [\[R\]](#), [\[R\]](#), [\[R\]](#).

15



Artichoke

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Incorporate fresh or cooked artichoke into your diet 2-3 times per week. Each serving should include approximately one medium-sized artichoke or about 120 grams if using hearts. This can be included in meals such as salads, pastas, or as a steamed side dish.

Description

Artichokes are a vegetable known for their unique flavor and potential health benefits. They are a good source of fiber, vitamins, and minerals, and may support digestion, liver health, and antioxidant protection.

How it helps

Artichoke has powerful antioxidants and fiber that can help boost your heart health, regulate your blood sugar levels, and decrease insulin resistance. It may improve your body's use of insulin and decrease your risk of developing type 2 diabetes.

A [meta-analysis of 9 trials](#) concluded that supplementation with artichokes and artichoke products **lowers fasting blood glucose (by 5.28 mg/dL) and HOMA-IR (only in a nocosupplementation form)** [\[R\]](#).

16



Berberine

IMPACT3 / 5

EVIDENCE3 / 5

How to implement

Take 500 mg of berberine two times a day before meals. Continue this regimen for up to three months, then evaluate its effects with your healthcare provider.

TYPICAL STARTING DOSE

500 mg

Description

Berberine is a compound found in certain plants, known for its potential to support blood sugar control and heart health.

[Berberine](#) is an active compound of some plants used in traditional medicine, such as [\[R\]](#):

- European barberry
- Oregon grape
- Goldenseal
- Chinese goldthread
- Tree turmeric

Berberine is also available as a supplement. People use it to help with [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Diabetes
- High cholesterol
- High blood pressure
- PCOS

How it helps

Berberine (0.5-1.5 g/day for 2-6 months) may help reduce insulin resistance and control blood sugar [\[R\]](#), [\[R\]](#).

Berberine may also reduce insulin resistance in women with PCOS [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

The combination of berberine and [milk thistle](#) may provide similar benefits [\[R\]](#).

17



Barberry and Milk Thistle

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Take a supplement containing 500mg of barberry extract and 150mg of milk thistle extract, twice daily with meals. Continue this regimen for at least 8 weeks to potentially see improvements.

Description

Barberry is an herbal remedy used in traditional medicine for its potential to support digestive health and reduce inflammation. It contains compounds that may have antimicrobial and antioxidant properties.

Milk thistle (*Silybum marianum*) is a purple flowering plant in the daisy family. Traditionally, it has been used for liver problems. Some people also eat the leaves in salads [\[R\]](#), [\[R\]](#).

The extract of milk thistle is called *silymarin* [\[R\]](#), [\[R\]](#), [\[R\]](#).

People use milk thistle to help with [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Liver problems
- Blood sugar control
- Indigestion
- Skin problems

How it helps

The combination of barberry has demonstrated positive effects on insulin resistance. A meta-analysis of 4 trials involving 491 patients with dyslipidemia showed that this combination reduced insulin resistance and fasting glucose. In a placebo-controlled trial of 136 obese individuals with type 2 diabetes, treatment with this combination for 6 months resulted in significant improvements in insulin resistance and various glycemic control parameters. However, a separate meta-analysis of 7 studies and 452 participants found that barberry supplementation alone lowered insulin levels but did not significantly affect fasting glucose, insulin resistance, or HbA1c [\[R\]](#), [\[R\]](#), [\[R\]](#).

Barberry may help in treating insulin resistance as it contains berberine, a compound known for its anti-diabetic properties, which can help improve insulin sensitivity and aid glucose metabolism. Milk thistle, or silymarin, has anti-inflammatory and antioxidant properties which may improve liver function and aid in reducing insulin resistance.

The combination of barberry (*B. aristata*) and milk thistle lowers fasting glucose and insulin resistance according to a meta-analysis of 4 trials and 491 patients with dyslipidemia [\[R\]](#).

18



Probiotics

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Take a probiotic supplement containing 10 billion or more live cultures once daily, preferably with a meal or as directed by the packaging or a healthcare provider.

TYPICAL STARTING DOSE

10 billion

Description

Probiotics are live beneficial bacteria and yeasts that can support gut health and digestive function when consumed as supplements or found in fermented foods like yogurt and sauerkraut. They may be beneficial to gut health, immune function, blood sugar, and mood.

Probiotic bacteria are “good” bacteria found mainly in the large intestine. They support your body and mind by [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Maintaining gut health
- Supporting a healthy immune system
- Improving your mood
- Helping to maintain healthy blood sugar

Prebiotics are certain types of fiber and other complex carbs that serve as food for gut bacteria. **They support gut health by helping boost the activity and growth of “good” bacteria** [\[R\]](#), [\[R\]](#).

Prebiotics are also added to foods and supplements. Common prebiotic ingredients are [\[R\]](#), [\[R\]](#):

- Oligo-fructose
- Oligo-galactose
- [Inulin](#)

Mixtures of probiotics and prebiotics are known as **synbiotics** [\[R\]](#).

How it helps

Probiotics may reduce blood sugar levels and improve insulin resistance in people with diabetes or at risk of this condition [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

A healthy gut helps your body use sugar by making it more sensitive to insulin [\[R\]](#).

Probiotics may also reduce insulin resistance in people with:

- NAFLD [\[R\]](#), [\[R\]](#)
- PCOS [\[R\]](#), [\[R\]](#)

The following probiotics may help [\[R\]](#), [\[R\]](#), [\[R\]](#):

- [L. acidophilus](#)
- [L. casei](#)
- [L. rhamnosus](#)
- [B. breve](#)
- [B. longum](#)
- [B. animalis](#)

19



Kefir

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Incorporate kefir into your daily diet by drinking approximately 1-2 cups (240-480 ml) per day. It can be consumed on its own, blended into smoothies, or used as a base for salad dressings or soups. Continuous consumption over several weeks is recommended to observe its health benefits.

Description

Kefir is a fermented dairy product packed with probiotics, which can promote gut health and support digestion. Regular consumption of kefir is associated with improved digestive function and may enhance the immune system.

How it helps

Kefir is a probiotic-rich food that helps boost the gut microbiota, positively influencing the body's insulin sensitivity and glucose regulation. Therefore, it aids in managing insulin resistance by enabling the body's cells to use insulin more efficiently.

A meta-analysis of 6 trials and 314 participants found that kefir reduced fasting insulin (by 3.69 mIU/mL) and HOMA-IR (by 2.56), but not HbA1c or fasting glucose. Another meta-analysis (6 trials) concluded that kefir reduces fasting glucose and insulin [\[R\]](#), [\[R\]](#).

20



Resistant Starch

IMPACT

2 / 5

EVIDENCE

3 / 5

How to implement

Incorporate 40g of Jo's resistant starch into your daily diet. This can be done by adding it to smoothies, yogurt, or baked goods. Ensure to spread the intake throughout the day for better tolerance.

TYPICAL STARTING DOSE

40 g Hi-Maize

Description

Resistant starch is a type of starch that resists digestion in the small intestine, making it a prebiotic fiber that can benefit gut health. It can be found in foods like green bananas, legumes, and certain grains.

[Resistant starch](#) is starch that doesn't get digested in the small intestine [\[R\]](#), [\[R\]](#).

Some types of resistant starch include [\[R\]](#):

- **Type 1** occurs naturally in foods such as whole grains
- **Type 2** can be isolated from foods such as corn and green banana
- **Type 3** is created during the cooking and cooling process of starchy foods like potatoes

Resistant starch doesn't increase blood sugar like typical digestible starches do [\[R\]](#), [\[R\]](#).

Instead, it feeds good bacteria in the colon that [\[R\]](#), [\[R\]](#):

- Support healthy gut function
- Support immunity
- Reduce inflammation

How it helps

Supplementation with resistant starch (10-40 g/day for 4-12 weeks) may improve insulin sensitivity. It may help both healthy people and those with type 2 diabetes [\[R\]](#), [\[R\]](#), [\[R\]](#).

Resistant starch **delays the absorption of sugar**, which prevents blood sugar spikes. It may even boost your response to insulin [\[R\]](#).

21



Cinnamon

IMPACT

2 / 5

EVIDENCE

3 / 5

How to implement

Take a 1 g cinnamon supplement once daily, ideally with a meal to aid absorption. This can be in the form of a capsule or tablet. Continue this regimen as long as it aligns with your health goals and under the guidance of a healthcare provider.

TYPICAL STARTING DOSE
500 mg

Description

Cinnamon is a popular spice that may have various health benefits, including improving blood sugar control, reducing inflammation, and providing antioxidants. It's commonly used in both culinary and herbal applications.

[Cinnamon](#) is a spice made from the bark of *Cinnamomum* trees. Cinnamon can [\[R\]](#):

- Decrease inflammation
- Fight [oxidative stress](#)
- Kill microbes

Cinnamon is mainly used in cooking and fragrances. **As a natural remedy, people use cinnamon to reduce blood sugar** [\[R\]](#).

There are two main types of cinnamon [\[R\]](#):

- Ceylon or ‘true’ cinnamon (*Cinnamomum verum*)
- Chinese or Cassia cinnamon (*Cinnamomum cassia*)

How it helps

Cassia cinnamon (120-6,000 mg/day for 4-18 weeks) may improve blood sugar control and insulin resistance in people at risk of diabetes or already living with thi condition [\[R\]](#).

However, the evidence is mixed. In line with this, health experts say there’s not enough evidence to recommend cinnamon supplementation for diabetes [\[R\]](#), [\[R\]](#).

Cinnamon may also improve insulin resistance in women with PCOS [\[R\]](#).

Please note: *Cassia cinnamon is high in coumarin. This substance may harm the liver in large amounts. Consult your doctor before supplementing with high doses of Cassia cinnamon* [\[R\]](#), [\[R\]](#), [\[R\]](#).

22



Vanadium

IMPACT

2 / 5

EVIDENCE

3 / 5

Description

Vanadium is a trace mineral that is found in small amounts in many foods. It is important for bone health, blood sugar control, and cholesterol levels. Vanadium may also help to protect against cancer and heart disease.

How it helps

Supplementation with vanadyl sulfate (100 mg/day for 3-6 weeks) improved fasting glucose, HbA1c, and hepatic and peripheral insulin sensitivity in placebo-controlled trials of 41 patients with non-insulin-dependent diabetes. However, it failed to improve insulin sensitivity in a placebo-controlled trial of 14 obese patients with impaired glucose tolerance. Similarly, it failed to enhance insulin action in another trial on type 1 diabetic patients [R, R, R, R, R, R].

Similarly, vanadium-enriched yeast supplementation (0.9 mg/day vanadium pentoxide) for 12 weeks improved anthropometric indices and glycemic parameters in a placebo-controlled trial of 44 obese type 2 diabetes patients [R].

23



Maintain Optimal Vitamin D Levels

IMPACT2 / 5

EVIDENCE3 / 5

How to implement

Check your vitamin D levels, they should ideally be in the 30-66 ng/mL range. If your levels are lower than that, take a vitamin D supplement, 1000-4000 IU daily, to reach an optimal range.

TYPICAL STARTING DOSE

1000 iu

Description

Vitamin D, often referred to as the "sunshine vitamin," can be synthesized by the skin when exposed to sunlight, as well as being found in fish, eggs, and fortified milk. It helps regulate calcium absorption, promoting strong bones and a healthy immune system. Vitamin D deficiency can lead to conditions like rickets in children and osteoporosis in adults.

Your body needs [vitamin D](#) for strong bones. Vitamin D also plays a role in [\[R\]](#):

- Mood
- Immunity
- Heart health
- Blood sugar control

[Sunlight](#) is our main source of vitamin D. Experts recommend getting at least **5-15 minutes of midday sun, 2-3 times per week**. People with darker skin and those living at high latitudes may need longer periods of sun exposure [\[R\]](#), [\[R\]](#).

Foods like fish, eggs, and fortified milk provide small amounts of vitamin D. **People lacking vitamin D should consider taking a supplement** [\[R\]](#).

How it helps

People with vitamin D deficiency are more likely to have insulin resistance. This increases the risk of diabetes and prediabetes [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Vitamin D supplements may help reduce insulin resistance and control blood sugar. However, the effects are small, they may only help if you lack vitamin D, and the evidence is mixed [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

The combination of vitamin D with calcium may be more effective [\[R\]](#).

Health experts say there’s not enough evidence to recommend vitamin D supplementation for diabetes [\[R\]](#).

Vitamin D supplementation may also reduce insulin resistance in people with PCOS and NAFLD [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Please note: *Experts recommend getting 600-800 IU of vitamin D per day. Medical bodies recommend against taking more than 4,000 IU per day* [\[R\]](#).

24



Resveratrol

IMPACT

2 / 5

EVIDENCE

3 / 5

How to implement

Take 150-500 mg of resveratrol as a supplement daily, preferably with meals to enhance absorption. This dosage range is based on studies for various health benefits, and it's advised to not exceed 500 mg per day without medical supervision.

TYPICAL STARTING DOSE

150 mg

Description

Resveratrol is a natural compound found in red grapes, red wine, and some berries. It is known for its potential antioxidant properties and its role in promoting heart health.

[Resveratrol](#) is an antioxidant found mainly in [\[R\]](#):

- Berries
- Red grapes
- Red wine
- Peanuts

It’s purported to have anti-inflammatory and antioxidant effects [\[R, R, R\]](#).

How it helps

In patients with type 2 diabetes, supplementation with resveratrol may improve insulin sensitivity. However, resveratrol may not enhance the effectiveness of antidiabetic drugs [\[R, R, R, R, R\]](#).

Moreover, resveratrol may not improve insulin sensitivity in healthy subjects [\[R\]](#).

In patients with NAFLD, it may not improve the condition but may lower some metabolic risk markers including insulin resistance [\[R\]](#).

25

Avoid Phthalate Exposure

IMPACT2 / 5

EVIDENCE3 / 5

How to implement

To avoid phthalate exposure, check product labels and choose phthalate-free options for personal care items, plastics (look for recycling codes 3 and 7 or the letters 'V' or 'PVC'), and household products. Additionally, reduce the use of plastic containers for food storage, especially those not marked as 'phthalate-free', and avoid microwaving food in plastic containers. Aim to make these changes consistently in your daily life for long-term health benefits.

Description

Avoiding phthalate exposure involves choosing phthalate-free products, such as personal care items and plastics, to minimize potential endocrine-disrupting effects and protect reproductive and hormonal health.

How it helps

Reducing phthalate exposure can assist in managing insulin resistance as phthalates, commonly found in plastics and personal care products, interfere with the body's ability to regulate insulin and glucose. Hence, limiting exposure can ensure better insulin function and avoid unnecessary strain on your hormonal balance.

Meta-analyses were performed on 16 studies. Exposure to MnBP, MBzP, MCPP, MEHP, MEOHP, MEHHP, ΣDEHP, and high-molecular weight phthalate (ΣHMWP) was associated with the increase of the homeostasis model assessment of insulin resistance (HOMA-IR) index. The results of sensitivity analyses stratified by age, sex, and site of study remained stable, suggesting the robustness of these meta-analyses [\[R\]](#).

In the random effects meta-analysis of all studies (n = 8), the pooled correlation coefficient between phthalate exposure and HOMA-IR was 0.10 [\[R\]](#).

Of the 2067 participants included, 872 (42.19 %) were identified as insulin resistant. In single-chemical GLM model, di-2-ethylhexyl phthalate (DEHP) had the highest parameter (β/OR, 95 % CIs) of 0.21 (quartile 4, 0.12- 0.29) and 1.95 [\[R\]](#).

26



L-Carnitine

IMPACT

2 / 5

EVIDENCE

3 / 5

How to implement

Take 500 mg of L-carnitine supplement daily with a glass of water, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

500 mg

Description

L-carnitine is an amino acid-like compound that plays a role in energy metabolism and helps prevent toxic substances from building up in cells. It is often used in dietary supplements for its potential to support muscle recovery, reduce fatigue, and enhance athletic performance.

[L-carnitine](#) is a compound that helps you burn fat. It also prevents toxic substances from building up in cells [\[R\]](#).

Your body can usually make enough carnitine to meet its needs. You can also get it from **meat and dairy products** [\[R\]](#).

People use L-carnitine for [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Heart problems
- Overactive thyroid
- Fertility problems
- Blood sugar control
- Weight control

How it helps

L-carnitine may boost your sensitivity to insulin. It helps remove chemicals linked to insulin resistance from your cells [\[R\]](#).

L-carnitine (0.2-3 g/day for 1-12 months) may help reduce insulin resistance and blood sugar levels in people at risk of diabetes [\[R\]](#), [\[R\]](#).

L-carnitine may also help people with NAFLD reduce their insulin resistance [\[R\]](#).

27



Curcumin

IMPACT

2 / 5

EVIDENCE

3 / 5

How to implement

Take a 500 mg curcumin supplement daily with food. To enhance absorption, take it with a meal that contains fats or oils since curcumin is fat-soluble.

TYPICAL STARTING DOSE
500 mg

Description

Curcumin is a compound found in turmeric known for its anti-inflammatory and antioxidant properties. It has been studied for its potential to reduce inflammation, support joint health, and contribute to overall well-being.

[Turmeric](#) is a yellow spice from India. It may reduce inflammation and [oxidative stress](#) [\[R\]](#).

The most important active compound in turmeric is **curcumin**. People use curcumin for [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Joint pain
- Hay fever
- Mood
- High blood sugar
- Gut health
- Liver health

How it helps

Curcumin (up to 4 g/day for 4-12 weeks) may lower blood sugar and improve insulin resistance. Curcumin may help in people at risk of metabolic disorders, as well as those with type 2 diabetes and metabolic syndrome [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Curcumin may also reduce insulin resistance in women with PCOS [\[R\]](#), [\[R\]](#), [\[R\]](#).

Note that curcumin is hard to absorb. Look for supplements with *bioavailable* curcumin, which is easier to absorb. Combining it with [piperine](#) (a compound in black pepper) may also help [\[R\]](#), [\[R\]](#).

Health experts say there’s not enough evidence to recommend curcumin supplementation for diabetes [\[R\]](#).

Please note: *curcumin may interfere with iron absorption due to its iron-chelating properties, potentially exacerbating anemia or making it harder to manage. If you have anemia, consult your healthcare provider before using curcumin or turmeric supplements* [\[R\]](#), [\[R\]](#), [\[R\]](#).

28



Soy Isoflavones

IMPACT2 / 5

EVIDENCE3 / 5

How to implement

Take a soy isoflavone supplement containing 40 to 80 milligrams daily, ideally with food to improve absorption. This dosage can be continued on a daily basis for several months, but it's recommended to reevaluate its effectiveness and any potential side effects with a healthcare provider periodically.

TYPICAL STARTING DOSE

40 mg

Description

Soy isoflavones are natural compounds found in soybeans and soy products. They are phytoestrogens, which means they can mimic the effects of estrogen in the body and are associated with potential health benefits like menopausal symptom relief and improved heart health.

Soy is a common food in many cuisines around the world, especially Asian cuisines [\[R\]](#).

It's a great source of [\[R\]](#), [\[R\]](#):

- Plant-based protein
- Fiber
- Omega-3 fats
- Antioxidants (isoflavones)

Soy-based foods include [\[R\]](#):

- Tofu
- Tempeh
- Edamame
- Miso
- Natto

Soy protein and soy isoflavones are also available as supplements.

How it helps

Soy isoflavones may help reduce insulin resistance. Women around their menopause may reduce their insulin resistance if they supplement with soy isoflavones (54-120 mg/day for 3-6 months) [\[R\]](#), [\[R\]](#).

Soy isoflavones may also reduce insulin resistance in people with the following conditions:

- PCOS [\[R\]](#)
- NAFLD [\[R\]](#)

However, soy may have no effect on insulin resistance in people with type 2 diabetes [\[R\]](#).

29



Genistein

IMPACT

2 / 5

EVIDENCE

3 / 5

How to implement

Take a genistein supplement daily, with a usual dosage range between 30 mg to 100 mg. It is best taken with food to enhance absorption. Continue this regimen daily for at least six months to evaluate its benefits fully.

TYPICAL STARTING DOSE

30 mg

Description

Genistein is an isoflavone found in soy products that may offer potential health benefits, including antioxidant and anti-inflammatory properties. It has been studied for its potential role in hormone regulation and the reduction of certain cancer risks.

How it helps

- A meta-analysis of seven trials involving 670 postmenopausal women found that genistein significantly reduced fasting glucose levels, fasting insulin concentrations, and HOMA-IR values compared to placebos [\[R\]](#).
- A meta-analysis of 11 studies found that genistein improved HOMA-IR (by 0.51) compared to controls. Subgroup analysis revealed greater benefits in women with BMI <30 kg/m² and no metabolic disorders. Additionally, secondary outcomes showed significant differences in total cholesterol, HDL cholesterol, fasting glucose, and insulin, but not in triglycerides or BMI [\[R\]](#).
- Another meta-analysis found that genistein lowered fasting glucose (by 7.15 mg/dL), insulin (by 1.37 microIU/mL), and insulin resistance (by 0.39) [\[R\]](#).
- Genistein may help by improving the function of cells that produce insulin.

30



Avoid Air Pollution

IMPACT2 / 5

EVIDENCE3 / 5

How to implement

Stay indoors on days when air quality indexes (AQI) indicate high pollution levels, which are often reported by weather services or government environmental agencies. **Install air purifiers** in your home, especially in bedrooms, to reduce indoor pollutants. Limit outdoor exercise when air pollution warnings are issued, opting for indoor activities instead.

Description

Avoiding air pollution by reducing exposure to pollutants in the environment is essential for respiratory and overall health. It can help lower the risk of respiratory diseases, cardiovascular conditions, and other health issues associated with poor air quality.

While city life is convenient in a lot of ways, it comes with some health hazards. Cars, factories, and other sources increase air [pollution](#) [R].

Air pollution plays a role in [R](#), [R](#), [R](#), [R](#), [R](#):

- Lung disease
- Heart disease
- Diabetes
- Asthma
- Skin conditions

How it helps

While city life is convenient in a lot of ways, it comes with some health hazards. Cars, factories, and other sources increase air [pollution](#) [R].

Air pollution plays a role in [R](#), [R](#), [R](#), [R](#):

- Lung disease
- Heart disease
- Diabetes
- Cancer

31

Walking

IMPACT

2 / 5

EVIDENCE

3 / 5

How to implement

Incorporate at least 30 minutes of brisk walking into your daily routine, aiming for a minimum of five days a week. This can be done in one continuous session or broken into shorter periods, such as three 10-minute walks throughout the day.

TYPICAL STARTING DOSE

30 minutes

Description

Walking is a low-impact form of exercise that can contribute to cardiovascular fitness, weight management, and improved overall health. It is used to support physical activity goals, enhance mood, and promote better cardiovascular health.

How it helps

Walking increases your muscles' insulin sensitivity, which enhances your body's ability to utilize glucose efficiently. Regular walking also helps you maintain a healthy weight, a key factor in preventing insulin resistance.

Meta-analysis of 20 RCTs in 866 type 2 diabetes patients showed walking lowered HbA1c by 0.50%. Supervised walking (-0.58%) and non-supervised with motivational strategies (-0.53%) were effective. It also reduced BMI and diastolic BP but had mixed effects on other factors [R].

Meta-analysis of 37 RCTs (2001 participants)showed walking benefits 7 CVD risk factors (e.g., BMI, blood pressure). No clear dose-response relationship was identified, and there was insufficient evidence to specify optimal walking parameters [R].

32



Alpha-Lipoic Acid

IMPACT2 / 5

EVIDENCE3 / 5

How to implement

Take 600-1800 mg of alpha-lipoic acid daily, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

100 mg

Description

[Alpha-lipoic acid](#) is a natural antioxidant found in almost every cell in your body. People use alpha-lipoic acid to help with issues like skin aging, weight loss, and high blood sugar [\[R, R, R\]](#).

People use alpha-lipoic acid to help with [\[R, R, R, R\]](#):

- Complications of high blood sugar
- Skin aging
- Weight loss
- Carpal tunnel syndrome

How it helps

Alpha-lipoic acid (ALA) has similar effects as insulin. It may help your body use sugar more efficiently [\[R, R\]](#).

Supplementing with ALA may improve long-term blood sugar control and insulin resistance. However, a study found no effects on insulin resistance [\[R, R, R\]](#).

33



Magnesium Chloride

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Take 200-400 mg of magnesium chloride daily, ideally in divided doses with meals to reduce the risk of stomach upset. It can be taken indefinitely as part of a daily supplementation routine to support magnesium levels in the body.

TYPICAL STARTING DOSE

200 mg

Description

Magnesium chloride is a magnesium supplement that can be used to support magnesium levels in the body. It may help alleviate symptoms of magnesium deficiency, such as muscle cramps and fatigue.

How it helps

Magnesium Chloride aids in regulating blood sugar levels, which can help improve insulin sensitivity. This supplement also plays a role in the metabolism of carbohydrates, which may reduce insulin resistance.

In a placebo-controlled trial of 198 participants with metabolic syndrome and low serum magnesium, supplementation with 5% magnesium chloride lowered systolic blood pressure (by 3.6 mmHg), diastolic blood pressure (by 5.5 mmHg), fasting glucose (by 12.4 mg/dL), triglycerides (by 61.2 mg/dL) while increasing HDL cholesterol (by 0.9 mg/dL) [\[R\]](#).

A randomized controlled trial of people with prediabetes found that oral magnesium chloride reduced the risk of diabetes and cardiovascular disease. In another placebo-controlled trial of 63 patients with type 2 diabetes, supplementation with magnesium chloride for 16 weeks lowered the HOMA-IR index (by 1.2), fasting glucose (by 2.3 mmol/L), and HbA1c. Magnesium chloride (2.5 g/day for 3 months) also lowered HOMA-IR (by 2) in a placebo-controlled trial of non-diabetic subjects with insulin resistance [\[R\]](#), [\[R\]](#), [\[R\]](#).

However, sustained-release magnesium chloride (384 mg/day for 6 weeks) only lowered systolic blood pressure (by 7.4 mmHg) in a placebo-controlled trial of 28 diabetic patients [\[R\]](#).

Magnesium may help by improving the ability of pancreatic beta-cells to improve insulin sensitivity [\[R\]](#).

34



Broccoli Sprouts

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Consume 2-4 tablespoons of fresh broccoli sprouts daily. They can be added to salads, sandwiches, or smoothies to make them easier to consume. Continue this practice daily for at least 3 months to potentially see benefits.

TYPICAL STARTING DOSE

2 tbsp

Description

Broccoli and broccoli sprouts are nutrient-dense vegetables packed with vitamins, minerals, and antioxidants. They are known for their potential to support a healthy immune system, protect against chronic diseases, and promote overall nutritional wellness.

How it helps

Broccoli sprouts are potent in sulforaphane, a compound that can enhance insulin sensitivity, supporting the body to use sugar more efficiently. This can help manage insulin resistance and potentially prevent the development of Type 2 diabetes.

In a study with 81 patients, those receiving 10g/d of broccoli sprout powder (BSP) for 4 weeks showed a significant decrease in serum insulin concentration and HOMA-IR compared to placebo (p=0.05) [\[R\]](#).

35



Myo-inositol

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Take 2 grams of myo-inositol supplement orally twice a day, preferably with meals to enhance absorption. This regimen should be followed daily for at least 6 months to observe significant benefits.

TYPICAL STARTING DOSE

4 g

Description

Myo-inositol is a naturally occurring compound that plays a role in various cellular functions. It is used in dietary supplements and is believed to have potential benefits for mental health, hormone regulation, and insulin sensitivity.

Inositol is a type of sugar that our bodies need to function. It was considered a vitamin (vitamin B8) until it was discovered that our bodies can make it from another common sugar, glucose [\[R\]](#).

[Myo-inositol](#) is the most common form of inositol. It plays a role in [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Heart health
- Normal blood sugar levels
- Mental health
- Cognitive function
- Reproductive health

Myo-inositol can convert to [D-chiro-inositol](#) in the body. These two forms of inositol are often combined in supplements. People use them to improve blood sugar control and PCOS [\[R\]](#), [\[R\]](#), [\[R\]](#).

How it helps

In a 12-month study with 80 postmenopausal women and metabolic syndrome, myo-inositol (2 g b.i.d) showed significant improvements in glucose, insulin, HOMA-IR, triglycerides, HDL cholesterol, and blood pressure compared to placebo, while BMI and waist circumference remained unchanged [\[R\]](#).

In a study of 80 postmenopausal women with metabolic syndrome, myo-inositol (2g BID) alongside diet for 6 months significantly improved systolic and diastolic blood pressure, HOMA index, cholesterol, and triglycerides, while increasing HDL cholesterol (22%) compared to the diet and placebo groups [\[R\]](#).

36



Cardamom

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Take 500 mg of cardamom powder or extract supplement daily with water, preferably after meals. Continue this regimen daily for at least 8-12 weeks to potentially observe benefits.

TYPICAL STARTING DOSE

500 mg

Description

Cardamom is a fragrant spice known for its potential to aid digestion, reduce inflammation, and provide antioxidant benefits. Incorporating cardamom into your diet or as a herbal remedy can promote overall digestive comfort and well-being.

[Cardamom](#) (*Elettaria cardamomum*) is a plant in the ginger family used to flavor food. It’s also known as green cardamom or the “Queen of Spices,” due to its price tag [\[R\]](#), [\[R\]](#).

The plant produces pods or capsules that contain 15-20 seeds each. The seeds can be used whole or can be ground to a fine powder before use [\[R\]](#), [\[R\]](#).

Some people use cardamom powder to help lower triglycerides [\[R\]](#), [\[R\]](#).

How it helps

A meta-analysis of 6 studies and 410 participants concluded that supplementation with cardamom (3 g/day for 2-3 months) reduces insulin resistance [\[R\]](#).

Cardamom is rich in antioxidants that can prevent inflammation and protect cells in the pancreas, which produce insulin. This can help enhance your body's sensitivity to insulin and better manage insulin resistance.

37



Acupuncture

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Visit a licensed acupuncturist for a session, typically lasting between 30 to 60 minutes, once or twice a week. Depending on your specific condition, a course of treatment might range from a few weeks to several months.

TYPICAL STARTING DOSE

1 hour

Description

Acupuncture is a part of traditional Chinese medicine. It involves inserting thin needles at specific points on the body. People use it to relieve pain and allergies, as well as reduce nausea and improve sleep.

[Acupuncture](#) is a part of traditional Chinese medicine. It involves **inserting thin needles at specific points on the body**. People use it to [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Relieve pain
- Improve sleep quality
- Relieve allergies
- Reduce nausea

How it helps

Acupuncture may slightly reduce insulin resistance in people with excess weight or diabetes. Acupuncture may work better when combined with antidiabetic drugs. However, the evidence is generally of low quality [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Please note: *Acupuncture is generally safe for most people. However, it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a licensed acupuncturist for more information* [\[R\]](#).

38



Vinegar

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Incorporate 1-2 tablespoons of vinegar into your diet daily, either by using it as a salad dressing or by diluting it in a glass of water. It is important to not exceed this amount to avoid adverse effects.

Description

Vinegar is a liquid produced through fermentation, often used in cooking and as a condiment. It may have health benefits such as aiding digestion and potentially helping with blood sugar control in some individuals due to its acetic acid content.

[Vinegar](#) is often used in cooking to add sour flavor and to preserve foods through pickling. Some people also use vinegar for cleaning.

As a health food, vinegar may help [\[R\]](#), [\[R\]](#):

- Reduce blood sugar
- Control weight

How it helps

Vinegar (2-50 g) may reduce blood sugar spikes after a meal. **It does so by making you more sensitive to insulin** [\[R\]](#), [\[R\]](#).

Apple cider vinegar (20 mL/day) may lower insulin resistance and improve blood glucose control in people with type 2 diabetes [\[R\]](#).

39



Artemisia Extract

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Take an artemisia extract supplement, usually available in capsule form, with a typical dosage ranging from 200 to 400 mg daily. This should be taken with water, preferably after meals to reduce the risk of stomach upset. Follow the specific dosage recommended on the product label or by a healthcare provider for up to 4 weeks.

TYPICAL STARTING DOSE

200 mg

Description

Artemisia extract is derived from various species of the Artemisia plant, and it is used in traditional medicine for its potential medicinal properties. It is being studied for its possible role in supporting digestive health and immune function.

How it helps

A meta-analysis of 6 studies concluded that supplementation with artemisia extract reduces insulin resistance, but not fasting glucose or HbA1c [\[R\]](#).

40



Dill

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Take a dill supplement in capsule form, as directed on the product label, typically once per day with water. Always follow the manufacturer's recommended dosage or the advice of a healthcare professional. It's essential to check the product label for specific dosage information.

Description

Dill is an herb known for its potential to aid digestion and provide antioxidant benefits. It can be used as a flavorful addition to meals and may support digestive comfort.

How it helps

Dill supplement helps in managing insulin resistance by improving insulin sensitivity, which allows your body to use insulin more efficiently for sugar metabolism. It also aids in maintaining stable blood sugar levels, lowering the risk of diabetes-related complications.

A meta-analysis of 7 trials (330 participants) found that *A. graveolens* supplementation lowered LDL-cholesterol, insulin levels, and insulin resistance, particularly in higher doses and long-term use, but had no impact on total cholesterol, triglycerides, or HDL, except for a drop in fasting blood glucose at 1500 mg/day [R].

In a single-blind, placebo controlled study with 150 hyperlipidemic patients, enteric-coated anethum tablet (650 mg, 2x/day for 6 weeks) **increased triglycerides (by 14.74 mg/dL, 6.0%), without changing total cholesterol and LDL-cholesterol** [R].

A single-center, randomized, double-blind, placebo-controlled study with 42 patients with type 2 diabetes found that dill (3 g/day for 8 weeks) **decreased insulin, homeostatic model assessment of insulin resistance, LDL-cholesterol, total cholesterol and malondialdehyde** although less than placebo. It also **increased HDL-cholesterol**, more than placebo, and total antioxidant capacity [R].

41



Mediterranean Diet

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Incorporate a variety of primarily plant-based foods, such as fruits, vegetables, whole grains, nuts, and legumes, into every meal. Choose healthy fats, like olive oil, over saturated fats and consume fish and poultry at least twice a week. Limit red meat to a few times a month and include a moderate amount of dairy products. Opt for water and red wine in moderation as your beverages.

Description

The [Mediterranean diet](#) is based on the traditional cuisine from the Mediterranean regions. It moderates the intake of red meat and dairy, while being rich in fruits and vegetables, whole grains, and healthy fats ([olive oil](#)).

The [Mediterranean diet](#) focuses on traditional cuisine from the Mediterranean regions. It’s rich in [\[R\]](#):

- [Olive oil](#)
- Fruits and vegetables
- Whole grains
- Nuts and seeds
- Fish

This type of diet may **reduce inflammation and protect the brain and heart** [\[R, R, R, R\]](#).

Limited intake of animal products, saturated fat, and refined sugar likely contribute to the health benefits of the Mediterranean diet [\[R\]](#).

How it helps

The **Mediterranean diet may lower blood sugar levels in the long run**. It’s rich in foods that help reduce inflammation and insulin resistance [\[R, R\]](#).

42



Yacon

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Incorporate yacon, which is a sweet-tasting root vegetable, into your diet by consuming 1-2 teaspoons of yacon syrup with meals daily to benefit from its prebiotic and blood sugar-lowering properties. Alternatively, yacon root can be eaten raw, baked, or made into tea. It's recommended to start with smaller amounts to assess tolerance.

Description

Yacon is a root vegetable native to South America and is used as a natural sweetener due to its high content of fructooligosaccharides. Yacon syrup or powder is often consumed for its potential prebiotic effects, promoting gut health and supporting weight management.

How it helps

In a placebo-controlled trial of 55 obese women, consuming yacon syrup (0.14-0.29 g/kg/day) for 120 days decreased fasting insulin and insulin resistance [\[R\]](#).

Yacon, rich in fructooligosaccharides, can improve insulin resistance as this sugar type helps to regulate insulin levels and improves glucose metabolism. Its high fiber content also aids in balancing blood sugar levels.

43



Inositol

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Take inositol as a daily supplement, usually available in powder or capsule form. The typical dosage ranges from 2 grams to 18 grams per day, divided into smaller doses taken with meals and water to aid absorption. It's important to start with a lower dose and gradually increase to avoid digestive side effects.

TYPICAL STARTING DOSE

2 g

Description

Inositol is a naturally occurring compound that plays a role in cell signaling and neurotransmitter function. It has been studied for its potential in promoting mental health and managing conditions like anxiety and depression when used as a supplement under the guidance of a healthcare professional.

Inositol is a type of sugar that our bodies need to function. It was considered a vitamin (vitamin B8) until it was discovered that our bodies can make it from another common sugar, glucose [\[R\]](#).

[Myo-inositol](#) is the most common form of inositol. It plays a role in [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Heart health
- Normal blood sugar levels
- Mental health
- Cognitive function
- Reproductive health

Myo-inositol can convert to [D-chiro-inositol](#) in the body. These two forms of inositol are often combined in supplements. People use them to improve blood sugar control and PCOS [\[R\]](#), [\[R\]](#), [\[R\]](#).

How it helps

In a 12-month study with 80 postmenopausal women and metabolic syndrome, myo-inositol (2 g b.i.d) showed significant improvements in glucose, insulin, HOMA-IR, triglycerides, HDL cholesterol, and blood pressure compared to placebo, while BMI and waist circumference remained unchanged [\[R\]](#).

In a study of 80 postmenopausal women with metabolic syndrome, myo-inositol (2g BID) alongside diet for 6 months significantly improved systolic and diastolic blood pressure, HOMA index, cholesterol, and triglycerides, while increasing HDL cholesterol (22%) compared to the diet and placebo groups [\[R\]](#).

44



Kimchi

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Incorporate about a half cup of kimchi into one of your daily meals. This could be as a side dish or part of the meal for at least one month to observe potential health benefits such as improved digestion.

Description

Kimchi is a fermented vegetable dish commonly consumed in Korean cuisine. It's packed with probiotics and nutrients, which can promote gut health and boost the immune system.

How it helps

Kimchi, a fermented vegetable dish rich in probiotics, can improve insulin resistance by promoting a healthy gut microbiome. Its dietary fiber also helps regulate blood sugar levels, thus enhancing insulin sensitivity.

- In a [non-placebo-controlled trial of 100 healthy volunteers](#), consuming kimchi (15-210 g/day) for 7 days had a **dose-dependent lowering effect on fasting glucose, total glucose, TC, and LDL-C**. The lipid-lowering effects of kimchi were **stronger in people with TC above 190 mg/dL and LDL-C above 130 mg/dL** [\[R\]](#).
- In a [non-placebo-controlled trial of 22 overweight and obese participants](#), consuming kimchi (both fresh and fermented) for 4 weeks **lowered fasting glucose, fasting insulin, and total cholesterol, especially if fermented** [\[R\]](#).
- In a [non-placebo-controlled trial of 21 prediabetic participants](#), consuming fermented kimchi for 8 weeks **decreased insulin resistance and improved glucose tolerance** [\[R\]](#).
- In a [placebo-controlled trial of 40 prediabetic participants](#), supplementation with the kimchi-derived probiotic Lactobacillus plantarum HAC01 for 8 weeks **reduced 2h-PPG and HbA1c levels** [\[R\]](#).

45



Breathing Techniques

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Practice deep breathing exercises for 10 minutes daily, preferably in a quiet space where you won't be disturbed. Sit or lie down in a comfortable position, slowly inhale through your nose, allowing your chest and lower belly to rise, hold the breath for a moment, and then exhale slowly through your mouth or nose. This can be done at any time of day to reduce stress and improve focus.

TYPICAL STARTING DOSE

10 minutes

Description

Breath awareness and specific breathing techniques, such as deep breathing or mindfulness-based practices, can help reduce stress, improve focus, and enhance overall mental well-being. These techniques are valuable tools for managing anxiety and promoting relaxation.

Most breathing techniques involve taking slow and even breaths. Their main goal is to prevent rapid breathing (**hyperventilation**) [\[R\]](#).

Breathing techniques tend to help with [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Stress
- Anxiety
- Sleep problems
- Asthma

One example is the **Buteyko breathing technique**. It's often used by people with asthma or other conditions that affect the lungs [\[R\]](#).

Another example is **yogic breathing**. [Yoga](#) is a practice that combines breathing techniques with exercise and meditation [\[R\]](#), [\[R\]](#).

How it helps

Stress releases chemicals that are linked to insulin resistance and high blood sugar levels. **Stress from work in particular may increase insulin resistance** [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Relaxation techniques that may reduce insulin resistance and balance blood sugar include:

- **Meditation**: helps you clear the mind and be aware of the present moment [\[R\]](#)
- **Yoga**: helps calm you down by combining breathing, stretching, and meditation [\[R\]](#), [\[R\]](#)

46



Avoid Perchlorate

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

To avoid perchlorate, check water quality reports for your area to ensure your drinking water does not contain high levels of perchlorate. Also, limit consumption of foods known to have higher perchlorate levels, such as leafy green vegetables, dairy products, and fruits, or opt for organic versions of these foods as organic farming standards restrict certain chemicals.

Description

Perchlorate is a chemical that can interfere with the thyroid gland's ability to produce thyroid hormone. This can lead to a variety of health problems, including hypothyroidism, developmental delays, and cancer. Avoiding perchlorate can help to protect your health.

How it helps

A study of 11,433 participants associated high levels of urinary perchlorate with a 53% higher risk of diabetes and higher fasting glucose, HbA1c, insulin, and insulin resistance [R].

Perchlorate can interfere with the thyroid's absorption of iodine, which regulates metabolism. This can lead to insulin resistance.

47



Wormwood

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Take a wormwood supplement capsule, typically ranging from 200 to 500 mg, once daily before a meal. The exact dosage may depend on the specific condition being treated and the product's concentration, so consult the supplement's packaging or a healthcare professional for guidance. Use should generally not exceed four weeks consecutively without a break or medical advice.

TYPICAL STARTING DOSE

200 mg

Description

Wormwood is an herb used in traditional medicine for its potential digestive benefits and as an ingredient in herbal liqueurs. It may aid in relieving digestive discomfort and expelling intestinal parasites. The main compound of interest is thujone.

How it helps

A meta-analysis of 6 trials concluded that supplementation with wormwood extract (typically, 1-3 g/day for 30-90 days) decreases insulin resistance but not other markers of glycemic control [R].

48



Tocotrienols

IMPACT

2 / 5

EVIDENCE

1 / 5

How to implement

Take tocotrienols as a dietary supplement in doses ranging from 100 to 200 mg, 1-2 times a day, ideally with meals to enhance absorption. This intake can be continuous, but it's recommended to review its effects with a healthcare provider periodically, typically every 6 to 12 months.

TYPICAL STARTING DOSE
100 mg

Description

Tocotrienols are a form of vitamin E that helps to protect your cells. They fight harmful substances in your body called free radicals, which can damage our cells and lead to illness. By helping your body in this way, tocotrienols contribute to overall health, boosting immunity, and slowing down aging processes.

How it helps

In 2 randomized controlled trials of 77 individuals with prediabetes and 110 with type 2 diabetes, delta-tocotrienol (300-250 mg/day for 12-24 weeks) reduced fasting plasma glucose, HbA1c, insulin, and insulin resistance. Two double-blinded randomized, active-controlled trials of 171 patients with NAFLD found that δ -tocotrienol lowered insulin resistance [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

49



Spinach

IMPACT

2 / 5

EVIDENCE

1 / 5

How to implement

Incorporate one cup of fresh spinach or half a cup of cooked spinach into your daily diet. You can add spinach to salads, smoothies, omelets, or pastas to easily increase your intake.

Description

Spinach is a leafy green vegetable packed with essential nutrients, including vitamins A and K, iron, and folate. Incorporating spinach into the diet supports eye health, bone health, and overall nutrition.

Spinach is a good source of molybdenum, folate, calcium, and iron, as well as vitamins A, C, and K1. A ½ cup serving provides 8 mcg of molybdenum or 18%DV.

How it helps

In a [placebo-controlled trial of 48 women with PCOS](#), supplementation with spinach-derived thylakoid (5 g/kg/day) for 28 weeks **decreased insulin resistance markers** [\[R\]](#).

Spinach is high in both fiber and magnesium, two essential nutrients that improve your body's sensitivity to insulin.

50



Chickpeas

IMPACT

2 / 5

EVIDENCE

1 / 5

How to implement

Incorporate chickpeas into your diet by adding them to salads, soups, and stews, or by making hummus. Aim for at least a half-cup serving, 3-4 times a week.

Description

Chickpeas, also known as garbanzo beans, are a good source of fiber, protein, and various vitamins and minerals. They can promote digestive regularity, provide sustained energy, and contribute to overall well-being when included in a balanced diet.

Chickpeas are a good source of minerals like manganese, iron, copper, zinc, and phosphorus, as well as folate and fiber. A ½ cup serving provides 0.9 mg of manganese or 39%DV.

How it helps

Chickpeas exhibited short-term benefits on insulin resistance, with a 50-g chickpea meal improving insulin response in women. However, prolonged dietary consumption of chickpea-based foods over 6 weeks did not lead to significant improvements in glycemic control compared to wheat-based foods. Another trial demonstrated that regular chickpea consumption over 12 weeks lowered fasting insulin levels and reduced insulin resistance in healthy individuals [\[R\]](#), [\[R\]](#).

Eating chickpeas can help prevent insulin resistance as they are rich in fiber, which slows down digestion and offers a steady supply of glucose to the blood. Plus, the proteins in chickpeas can further improve insulin sensitivity.

51



Grapes

IMPACT

1 / 5

EVIDENCE

3 / 5

How to implement

Incorporate a serving of grapes, which is about 32 seedless grapes or approximately 1 cup, into your daily diet. You can eat them as a snack, add them to salads, or blend them into smoothies. Do this consistently for a period of at least 3 months to observe potential health benefits.

Description

Grapes are a nutrient-dense fruit rich in vitamins, fiber, and antioxidants like resveratrol. Regular consumption of grapes is associated with potential benefits for heart health, skin health, and overall well-being.

How it helps

Grapes, specifically dark-colored ones, contain resveratrol which can improve insulin sensitivity and prevent insulin resistance. They also have a low glycemic index which means they release sugar into the blood slowly, avoiding sudden spikes in blood sugar levels.

A meta-analysis of 29 clinical trials (1,297 participants) found that grape/grape products supplementation significantly reduced insulin resistance (HOMA-IR) but had no effect on fasting insulin and Hb1Ac levels. Fasting blood glucose increased slightly in the control group [\[R\]](#).

How to implement

TYPICAL STARTING DOSE

500 mg

Description

Cumin (*Cuminum cyminum* L.) is a flowering herb cultivated in the Middle East, India, China, and the Mediterranean area [R].

- Diarrhea
- Stomachache
- High cholesterol
- Diabetes

How it helps

Cumin can lower the rate of blood glucose absorption in the body, thus helping regulate insulin levels. By balancing insulin levels, cumin may mitigate the effects of insulin resistance.

53



Taurine

IMPACT1 / 5

EVIDENCE2 / 5

How to implement

Take 1-4 g of taurine supplement daily, divided into two or three doses with meals for optimal absorption. It can be taken continuously, with periodic evaluations of its effects and benefits.

TYPICAL STARTING DOSE
500 mg

Description

Taurine is an amino acid found in various foods and often used in energy drinks and supplements. It plays a role in neurological and cardiovascular health and can help support energy metabolism.

[Taurine](#) is the most abundant free amino acid in humans. It's not essential, which means we can produce it. We can also get it from protein-rich foods, such as [\[R\]](#):

- Seafood
- Meat
- Dairy

Taurine is a popular additive in energy drinks and can also be taken as a supplement [\[R\]](#).

Taurine plays an important role in [\[R\]](#), [\[R\]](#):

- Bile production
- Calcium metabolism

It is also well-known for its antioxidant and anti-inflammatory properties [\[R\]](#).

How it helps

Taurine supplementation (3000 mg/day) for 8 weeks improved insulin resistance in type 2 diabetes patients, reducing fasting glucose, insulin, and HOMA-IR. Combining taurine with resistance training was most effective at lowering HOMA-IR and fasting blood glucose in women with type 2 diabetes. However, taurine (1.5 g/day) had no impact on insulin secretion or sensitivity in nondiabetic subjects [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Taurine can boost insulin sensitivity, which means your body will be better able to use insulin to control blood sugar levels, improving insulin resistance. Additionally, it reduces inflammation which is often increased in those with this condition.

54



Intermittent Fasting

IMPACT1 / 5

EVIDENCE2 / 5

How to implement

Limit your daily eating to a specific window of time, typically within an 8-hour period such as from 12 pm to 8 pm, and fast for the remaining 16 hours of the day. Repeat this daily or for at least 3-4 days per week.

Description

Intermittent fasting is an eating pattern that involves cycling between periods of fasting and eating. It may help with weight management, improve metabolic health, and offer potential benefits for certain health conditions when done under proper guidance.

[Intermittent fasting](#) (IF) is a pattern of eating that alternates between periods of eating and fasting. The most popular IF method is called the 16/8 method, where you fast for 16 hours and eat during an 8-hour window.

People mainly practice IF to lose weight. Besides benefits related to weight reduction, IF may help lower the risk of [\[R\]](#):

- Alzheimer's disease
- Joint pain
- Asthma
- Multiple sclerosis
- Stroke

Some types of intermittent fasting, such as Ramadan fasting, are also practiced for religious reasons.

How it helps

Intermittent fasting may have comparable effects to continuous energy restriction on glycemic control and better effects on weight loss. However, a study found no significant difference in HbA1c reduction with intermittent fasting compared to a standard diet. However, multiple studies found no significant benefits on blood pressure, cholesterol, or glucose levels [\[R, R, R, R, R, R\]](#).

Seventy-two studies (3134 participants) found that Ramadan-based intermittent fasting reduced fasting glucose levels (by 1.71 mg/dL) but had mixed effects on other glucometabolic markers [\[R, R\]](#).

Intermittent fasting may help by allowing your body more time to use glucose in the bloodstream for energy, therefore reducing overall blood sugar levels. It also improves insulin sensitivity so your cells can use available insulin more effectively.

55



Orange Juice

IMPACT

1 / 5

EVIDENCE

2 / 5

How to implement

Consume 8-ounces (about 240 milliliters) of orange juice daily, preferably in the morning with breakfast. This routine can be followed every day as part of a balanced diet for an indefinite period.

Description

Orange juice is a citrus beverage made from the juice of oranges. It is a rich source of vitamin C and other essential nutrients, contributing to immune support, skin health, and overall well-being.

How it helps

Orange juice is high in vitamin C and antioxidants, which can increase insulin sensitivity and prevent inflammation, helping to manage insulin resistance. It's also an excellent source of potassium, which aids in balancing out the negative effects of a high-sodium diet on blood pressure.

A meta-analysis of 15 trials with 639 participants found that orange juice consumption significantly lowers total cholesterol levels (WMD = -6.84 mg/dl; p = .01) and insulin resistance (WMD = -0.39; p = .04) compared to controls [\[R\]](#).

In a meta-analysis of 10 trials, orange juice consumption significantly reduced glucose, insulin, HOMA-IR, total cholesterol, LDL-C, and CRP levels compared to control, especially with ≥500 ml/day intake. No significant impact on body composition or other CVD risk factors was observed [\[R\]](#).

56



Jiaogulan (Gynostemma Pentaphyllum)

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a capsule of jiaogulan (gynostemma pentaphyllum) containing 450 mg to 500 mg, three times a day with meals. Continue this routine daily for best results.

TYPICAL STARTING DOSE

1350 mg

Description

Jiaogulan, often referred to as the "immortality herb," is an herb used in traditional Chinese medicine for its potential adaptogenic and antioxidant properties. Some research suggests it may support overall well-being and longevity, but more studies are needed to confirm these effects.

[Gynostemma](#) (*Gynostemma pentaphyllum*), also called jiaogulan, is a climbing vine native to Southeast Asia. It is used in traditional Chinese medicine for [R](#):

- High cholesterol
- Diabetes

People call it the "poor man's [ginseng](#)" because it may have similar benefits but cost less than Panax (Asian) ginseng [R](#), [R](#).

How it helps

Jiaogulan (*Gynostemma pentaphyllum*) can help treat insulin resistance by enhancing your body's insulin sensitivity, thereby improving glucose uptake. It also helps in reducing blood glucose levels, which is vital for managing insulin resistance.

In a placebo-controlled trial of 56 patients with NAFLD, supplementation with *Gynostemma pentaphyllum* (80 mL) for 4 months as an add-on to a controlled diet lowered BMI, AST, ALP, insulin, and insulin resistance better than the diet alone [R](#).

57



Beta-Alanine

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 2-3 grams of beta-alanine supplement daily, ideally in divided doses throughout the day to minimize potential skin tingling sensations. This supplementation can be continued for at least 4 weeks to observe benefits in exercise performance and muscle endurance.

TYPICAL STARTING DOSE

2 g

Description

Beta-alanine is an amino acid that can enhance muscle endurance by increasing the body's buffering capacity against lactic acid accumulation during intense exercise. Supplementing with beta-alanine may help improve athletic performance and delay muscle fatigue.

How it helps

Beta-alanine can increase muscle carnosine levels, thus improving muscle performance during high-intensity or endurance exercise. However, there's insufficient evidence to suggest it directly impacts insulin resistance.

Twenty studies, including 4 on humans and 16 on rodents, examined carnosine or beta-alanine supplementation. Evidence suggests it reduces fasting glucose, HbA1c, HOMA-IR, and fasting insulin in both humans and rodents with moderate certainty [R].

58



Amaranth

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate amaranth into your diet by adding it to your daily meals. You can use amaranth grains as a substitute for rice in dishes, add them to your morning porridge, or use amaranth flour in your baking recipes. Aim to include amaranth 2-3 times per week to reap its benefits.

Description

Amaranth is a nutritious, gluten-free grain-like seed that has been a staple in the diets of various cultures for centuries. It is rich in protein, fiber, vitamins, and minerals like calcium and iron. Amaranth is used to promote heart health, support digestion, and provide sustained energy.

How it helps

In a non-placebo-controlled trial of 81 obese participants, consuming amaranth seed oil (20 mL/day) as part of a 3-week weight-loss program improved insulin resistance, fasting insulin, and fasting glucose [R].

Amaranth's high fiber content slows digestion, which can prevent spikes in blood sugar and aid in managing insulin resistance.

59



Lactobacillus Acidophilus

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a probiotic supplement containing Lactobacillus acidophilus. Look for products that offer around 10 billion CFUs (colony-forming units) and take it once daily, preferably on an empty stomach, either first thing in the morning or right before bed.

TYPICAL STARTING DOSE
10 billion CFU

Description

[Lactobacillus acidophilus](#) is a [probiotic](#) bacterium that has been traditionally and widely used in the dairy industry to make yogurt [\[R\]](#).

More recently, *L. acidophilus* has been used as a probiotic. People take it to help with [\[R, R, R, R\]](#):

- High cholesterol
- Gut diseases
- Allergies
- Vaginal infections

How it helps

In a placebo-controlled trial of 45 men with type 2 diabetes, supplementation with *Lactobacillus acidophilus* NCFM for 4 weeks preserved insulin sensitivity [\[R\]](#).

The combination of a diet richer in fruits and vegetables and supplementation with a synbiotic containing *L. acidophilus* NCFM and *Bifidobacterium lactis* HN019 decreased weight, fasting glucose, insulin resistance, insulin, and triglycerides better than either of these interventions alone in a non-placebo-controlled trial of 55 overweight or obese participants [\[R\]](#).

60



Akkermansia

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take Akkermansia muciniphila as a supplement in capsule form, usually one capsule per day. It is best consumed with a glass of water, preferably in the morning. Follow this routine for a duration as advised by a healthcare provider, but commonly for a period of at least 8 to 12 weeks to observe potential benefits.

Description

Akkermansia is a type of gut bacteria that resides in the human digestive system. It has been studied for its potential role in gut health and its association with metabolic and immune functions.

How it helps

In a placebo-controlled trial of 32 overweight or obese participants with insulin resistance, supplementation with *Akkermansia muciniphila* (10^10 cfu/day) for 3 months increased insulin sensitivity (by 28.62%) while reducing insulin and total cholesterol levels, body weight (by 2.27 kg), fat mass (by 1.37 kg), and hip circumference (by 2.63 cm) [R].

Akkermansia supplements can increase the number of beneficial bacteria in your gut, which may improve sugar metabolism and insulin sensitivity.

61



Pecans

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate about a handful of pecans (roughly 1 ounce or 28 grams) into your daily diet. You can eat them as a snack, sprinkle chopped pecans over salads, or blend them into smoothies. Aim to do this regularly as part of your daily dietary habits to enjoy their health benefits.

Description

Pecans are a type of nut derived from the hickory tree, primarily native to North America. They are rich in nutrients like healthy fats, protein, dietary fiber, and various vitamins and minerals, including vitamin E, manganese, and zinc.

Pecans are a good source of fiber, along with manganese, molybdenum, copper, thiamine, and zinc. A 1-ounce serving provides 1.1 mg of manganese or 48%DV.

How it helps

Pecans are high in healthy fats and dietary fiber which help in controlling blood sugar levels and improving insulin sensitivity. By incorporating them into your diet, you can help manage insulin resistance.

In a non-placebo-controlled trial of 26 obese or overweight older adults, consuming a pecan-enriched diet (15% of total calories) for 4 weeks improved insulin, insulin resistance, and beta-cell function [R].

62



Sulforaphane

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Take a sulforaphane supplement, typically available in capsule form, with a dosage ranging from 30 to 60 milligrams per day. It is generally taken once daily, with or without food, according to the product's label instructions or a healthcare provider's advice. Continue this regimen daily for as long as you seek its benefits, but consult a healthcare provider for long-term use guidance.

TYPICAL STARTING DOSE

30 mg

Description

Sulforaphane is a natural compound found in cruciferous vegetables like broccoli and cauliflower. It is known for its potent antioxidant and anti-inflammatory properties, potentially offering protective effects against chronic diseases and promoting overall health.

How it helps

In a placebo-controlled trial of 81 patients with type 2 diabetes, supplementation with boccoli sprouts powder (10 g/day) for 4 weeks **lowered HOMA-IR and serum insulin** [\[R\]](#).

63



L-Citrulline

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 1.5 to 5 grams of L-citrulline supplements per day, orally, with or without food. This dosage can be taken all at once or divided into two to three smaller doses throughout the day. It's generally recommended to start at the lower end of the dosage range and adjust based on your body's response.

TYPICAL STARTING DOSE

3 g

Description

L-citrulline is an amino acid that may help improve blood flow and reduce muscle soreness, making it a popular supplement for athletes and individuals with certain cardiovascular conditions. Its potential to enhance nitric oxide production supports vascular health and overall circulation.

[Citrulline](#) is an amino acid (protein building block). Citrulline can be found in foods like [R](#), [R](#), [R](#), [R](#), [R](#):

- Watermelon
- Pumpkins
- Cucumber
- Bitter melon

The body uses L-citrulline to produce nitric oxide, a compound that helps widen blood vessels. It is important for heart and sexual health [R](#), [R](#), [R](#).

L-citrulline is commonly used as supplement to support [R](#):

- Blood vessel health
- Muscle health
- Metabolic health
- Sexual health

How it helps

L-Citrulline helps improve insulin resistance by boosting nitric oxide production, which enhances blood flow and allows more glucose to be delivered and used by your cells, thus lowering blood sugar levels. Additionally, it may promote muscle protein synthesis, which also contributes to improved insulin sensitivity.

In a placebo-controlled trial of 54 patients with type 2 diabetes, supplementation with citrulline (3 g/day) for 8 weeks lowered serum levels of insulin, glucose, HbA1c, and HOMA-IR [R](#).

64



Mangosteen

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 500-1000 mg of mangosteen extract daily, in capsule form, with meals. It is typically advised to start at the lower end of the dosage range and adjust based on tolerance and effect. Continue this regimen for at least 3-6 months to evaluate its benefits.

TYPICAL STARTING DOSE

500 mg

Description

Mangosteen is a tropical fruit rich in antioxidants and phytonutrients, potentially offering various health benefits, including anti-inflammatory and immune-supporting properties. It is commonly consumed for its potential to promote overall well-being.

How it helps

In a non-placebo-controlled trial of 22 patients with type 2 diabetes, supplementation with mangosteen extract as an add-on to behavioral therapy for 26 weeks **reduced insulin resistance better than behavioral therapy alone (by 53.22% vs. 15.23% in the control group)** [\[R\]](#)

Mangosteen contains compounds called xanthones that can boost insulin sensitivity, which helps your body use insulin more effectively to lower blood sugar levels. It also has anti-inflammatory properties that can reduce inflammation, a common factor in insulin resistance.

65



Lactobacillus Casei

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Take a supplement containing Lactobacillus casei daily, with a dosage recommended by the product's manufacturer or a healthcare professional. The specific amount can vary, but it is commonly found in doses around 10 billion colony-forming units (CFUs). Continue this regimen for at least 4 weeks to observe potential health benefits.

TYPICAL STARTING DOSE

10 billion CFU

Description

Lactobacillus casei is a probiotic bacterium known for its potential to support gut health and immune function. It contributes to a balanced gut microbiome and may help alleviate digestive issues like diarrhea.

[Lactobacillus casei](#) is a [probiotic](#) bacterium found in fermented foods (e.g., cheese), as well as in the reproductive and gastrointestinal tracts of humans and other animals [\[R, R\]](#).

People mainly take *L. casei* to support a healthy gut microbiota [\[R\]](#).

How it helps

Consuming *L. casei* Shirota maintained normal insulin sensitivity during a high-fat diet in a non-placebo-controlled trial. In a placebo-controlled trial with type 2 diabetes patients, *L. casei* supplementation improved insulin resistance. However, *L. casei* Shirota did not improve insulin sensitivity, β -cell function, endothelial function, or inflammation markers in another trial with metabolic syndrome patients [\[R, R, R\]](#).

L. casei can improve your gut health. Research shows a healthy gut can affect insulin resistance.

66



Neem

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 300-500 mg of neem extract daily with water, preferably after a meal. Do this for up to 10 weeks to help manage conditions like gastric ulcers and skin health. Always consult with a healthcare provider before starting any new supplement regimen.

TYPICAL STARTING DOSE

300 mg

Description

Neem is a medicinal plant from the mahogany family of trees, known for its antibacterial and anti-inflammatory properties, often used in skincare and herbal remedies to alleviate skin conditions, support oral health, and promote overall well-being.

Neem (*Azadirachta indica*) is a member of the mahogany family of trees. It is native to parts of Asia [\[R\]](#).

Neem may help support gum health and improve ulcers [\[R\]](#).

How it helps

In a placebo-controlled trial of 80 patients with metabolic syndrome, supplementation with neem leaf and twig extract (125-500 mg/day) for 12 weeks improved fasting blood glucose, postprandial blood sugar, insulin resistance, and HbA1c, as well as endothelial function and most markers of inflammation and oxidative stress [\[R\]](#).

Neem may help by improving insulin sensitivity and promoting the health of insulin-producing pancreatic cells.

67



Blackberries

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate a serving of blackberries into your daily diet, which is about 1/2 to 1 cup. You can add them to your morning cereal, blend them into a smoothie, or eat them as a snack.

Description

Blackberries are a delicious and antioxidant-rich fruit packed with vitamins and fiber. They can promote immune health, support digestive regularity, and contribute to overall well-being.

How it helps

Blackberries are rich in fiber which slows down the absorption of sugar into your bloodstream, preventing insulin spikes. They also contain antioxidants, which improves insulin sensitivity, causing less insulin to be released, helping manage insulin resistance.

In a study involving 27 overweight men on a high-fat diet, blackberries (600 g/day, 1500 mg flavonoids for 7 days) increased fat oxidation, lowered insulin levels (reduced AUC to 6485 vs. 8245 μ U·min/mL), and improved HOMA-IR compared to a control group (GEL) [\[R\]](#).

68



Bergamot

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 500-1000mg of bergamot extract supplements once daily, preferably in the morning with a meal for better absorption.

Description

Bergamot is a citrus fruit known for its aromatic peel, which is used to make essential oils and flavorings. It is sometimes used in aromatherapy and may have potential mood-enhancing effects when diffused or applied topically.

Bergamot (*Citrus bergamia*) is a bitter citrus fruit native to southern Italy. The fruit is inedible due to its sour taste. The peel is used to make essential oil, and the juice is used to make extracts. People use bergamot in food, supplements, and cosmetics [\[R\]](#).

How it helps

In a placebo-controlled trial of 45 patients with metabolic syndrome, supplementation with bergamot polyphenol extract (650-1300 mg/day) for 90 days lowered insulin resistance [\[R\]](#).

69



Saccharomyces Boulardii

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take *Saccharomyces boulardii* as an oral supplement, typically available in capsule or powder form, twice daily with a glass of water. Continue this regimen for 4-8 weeks, or as directed by a healthcare provider.

TYPICAL STARTING DOSE

10 billion CFU

Description

Saccharomyces boulardii is a beneficial yeast often used as a probiotic supplement to support digestive health and prevent or alleviate symptoms of diarrhea, including those caused by antibiotics or infections.

How it helps

In a placebo-controlled trial of 25 obese adults, supplementation with *S. boulardii* (5.0×10^9 CFU, 2x/day) for 60 days decreased HOMA-IR (by 0.48 points) [\[R\]](#).

S. boulardii can improve gut health, potentially reducing inflammation that contributes to insulin resistance.

70



Cupping Therapy

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

To practice cupping therapy as part of your lifestyle, schedule sessions with a qualified therapist once or twice a month to address specific concerns or for general wellness. Each session usually lasts between 5 to 15 minutes. Consistent treatment over several months may yield the best results.

TYPICAL STARTING DOSE

15 minutes

Description

Cupping therapy is an alternative therapy that involves placing cups on the skin to create suction. Some believe it may help with pain relief and muscle tension.

How it helps

Cupping Therapy can promote increased blood circulation, which potentially helps in improving insulin sensitivity. However, more conclusive scientific evidences are necessary to support this claim.

In a non-placebo-controlled trial of 120 patients with NAFLD, receiving wet cupping therapy (3 sessions over 1 month) decreased insulin resistance, ALT, and AST, and improved ultrasound images of the liver in 23% of the patients (compared to 10% in the control group) [\[R\]](#).

71



Ecklonia Cava

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a supplement of Ecklonia Cava extract, typically available in capsule format, with a standard dose ranging between 100-400 mg daily. It can be taken with or without food, but consistency in timing can help maintain stable levels in your body. It's generally recommended to start with the lower end of the dosing spectrum and adjust based on personal tolerance and efficacy. Continue taking daily for at least a few weeks to gauge the full effect.

TYPICAL STARTING DOSE

100 mg

Description

Ecklonia cava is a type of brown seaweed often used in supplements for its potential antioxidant and anti-inflammatory properties, which may support cardiovascular health and overall well-being.

Ecklonia cava, also known as “sea trumpet”, is a brown seaweed that grows along the coasts of Korea and Japan. People use it as a food, fertilizer, and supplement [\[R\]](#), [\[R\]](#).

Ecklonia cava is traditionally used to fight [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Urinary diseases
- Hemorrhoids
- Constipation

How it helps

Supplementation with Ecklonia cava extract (1,500 mg/day for 12 weeks) may reduce blood sugar spikes after a meal in people with a high risk of diabetes. It may do so by improving insulin sensitivity [\[R\]](#).

72



Mangiferin

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a mangiferin supplement of approximately 150-300 mg daily, ideally with a meal to enhance absorption. The duration of use depends on the specific health concern being addressed and recommendations from a healthcare provider.

TYPICAL STARTING DOSE

150 mg

Description

Mangiferin, a natural compound found in mangoes and other plants, is known for its antioxidant and anti-inflammatory properties. It has the potential to protect cells from oxidative stress and inflammation, promoting overall well-being.

Mangiferin is a natural compound found in mangoes and several other plants.

Researchers are interested in its potential benefits for blood sugar control, liver health, heart health, and more. However, the available evidence to support its use as a supplement is limited [\[R\]](#).

How it helps

In a placebo-controlled trial of 104 overweight patients with hyperlipidemia, supplementation with mangiferin (150 mg/day) for 12 weeks lowered insulin resistance [\[R\]](#).

Mangiferin may help by enhancing insulin sensitivity and glucose uptake in your cells.

73



Bifidobacterium Breve

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a Bifidobacterium breve supplement according to the product's specific instructions, usually 1-2 capsules daily with water, ideally before meals for better absorption. This regimen should be followed for at least 2-4 weeks to start observing benefits.

TYPICAL STARTING DOSE
10 billion CFU

Description

Bifidobacterium breve is another probiotic strain that can contribute to digestive health and support a balanced gut microbiome. People use *B. breve* as a supplement to improve skin health and combat allergies and infection.

[Bifidobacterium breve](#) is a probiotic species found in human breast milk and the gastrointestinal tracts of infant and adult humans. As an individual ages, the total population of B. breve within their gut decreases [\[R\]](#).

People use *B. breve* as a supplement to improve skin health and combat allergies and infections [\[R\]](#), [\[R\]](#), [\[R\]](#).

How it helps

Bifidobacterium Breve supplementation can help improve insulin resistance by promoting a healthier balance of gut bacteria, leading to better glucose metabolism. It can therefore support better control of blood sugar levels.

In a placebo-controlled trial of 101 obese youths with insulin resistance, supplementation with *B. breve* BR03 and B632 (2 x 10⁹ cfu/ay) for 8 weeks improved insulin sensitivity at fasting and during an oral glucose tolerance test [\[R\]](#).

74



Iyengar Yoga

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Attend a 90-minute Iyengar yoga class at least once a week. Choose a class led by a certified Iyengar yoga instructor to ensure proper guidance and technique adherence.

TYPICAL STARTING DOSE

1 hour

Description

Iyengar yoga is a style of yoga that emphasizes proper alignment and the use of props to support poses. It can help improve flexibility, balance, and mental well-being through precise and controlled movements.

How it helps

In a non-placebo-controlled trial of 50 stressed caregivers, practicing Iyengar yoga for 6 weeks failed to reduce stress but prevented the development of insulin resistance [R].

Iyengar yoga helps in weight control and stress management, both critical in managing insulin resistance.

75



Circadian Rhythm Alignment

IMPACT

1 / 5

EVIDENCE

1 / 5

Description

Circadian rhythm alignment is the process of adjusting your sleep-wake cycle to match the natural 24-hour cycle of the Earth's rotation. Circadian rhythm alignment has been linked to a number of health benefits, including improved sleep quality, better mood, and reduced risk of obesity, heart disease, and diabetes.

How it helps

In a non-placebo-controlled trial of 14 healthy volunteers, circadian misalignment reduced glucose tolerance mainly by lowering insulin sensitivity. In line with this, circadian misalignment increased postprandial glucose by 5.6% in a non-placebo-controlled trial of 9 shift workers [R, R].

76



Syrian Rhubarb (Rheum Ribes)

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a Syrian rhubarb supplement, usually available in capsule form, with a dosage of 200-400 mg daily. It is best consumed with meals to enhance absorption. Continue for a period as advised by a healthcare professional, often ranging from a few weeks to several months, depending on the condition being treated.

TYPICAL STARTING DOSE

200 mg

Description

Syrian rhubarb is a type of rhubarb plant often used in traditional medicine for its potential laxative effects.

How it helps

In a 6-week double-blind trial, 60 type 2 diabetic patients received aqueous or ethanolic *R. ribes* extract or a placebo. Both extracts lowered insulin, HOMA-IR, HOMA-B, ApoB, and ApoB/ApoA1 ratios significantly, but blood glucose levels remained unchanged. ApoA1 increased slightly [R].

Syrian rhubarb may help by reducing blood sugar levels and improving the body's response to insulin.

Please note: *Be careful with rhubarb if you are prone to allergies. High doses of rhubarb may cause diarrhea and abdominal cramps. Avoid long-term use due to dependence risk. Rhubarb is not safe for people with gut conditions, women who are pregnant or breastfeeding, and children under 12 years of age. Make sure to consult your doctor before taking rhubarb* [R, R].

77



CLA (Conjugated Linoleic Acid)

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 3 to 4 grams of CLA (conjugated linoleic acid) supplements daily, divided into two doses, preferably with meals to enhance absorption. Continue this regimen daily for at least 6 months to potentially see beneficial results.

TYPICAL STARTING DOSE

3 g

Description

CLA is a fatty acid found in meat and dairy products and is often used as a dietary supplement. Some studies suggest that CLA may have potential benefits for weight management and body composition by promoting fat loss and muscle preservation.

[Conjugated linoleic acids](#) (CLA) are **polyunsaturated fats** (PUFAs). They’re mainly found in meat and dairy. People also take them as supplements [\[R\]](#), [\[R\]](#).

CLA supplements are often marketed as weight loss aids [\[R\]](#).

How it helps

CLA can aid in Insulin Resistance by helping to improve insulin action, thus balancing blood sugar levels. The supplement also promotes fat loss, which can reduce the body's resistance to insulin.

Incorporating data from 18 randomized controlled trials and 2 crossover trials, combining CLA with exercise yielded significantly reduced body fat (SMD -0.42) and improved insulin resistance (SMD -0.25) compared to exercise alone [\[R\]](#).

Please note: *CLA supplementation may increase CRP, a marker of inflammation* [\[R\]](#), [\[R\]](#), [\[R\]](#).

78



Gentle Yoga

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Practice yoga for at least 20 to 30 minutes a day, most days of the week. Choose a style that matches your fitness level and goals, and consider attending a class or using online resources to guide your practice.

TYPICAL STARTING DOSE

20 minutes

Description

[Yoga](#) combines breathing, stretching, and relaxation techniques. Practicing yoga may help [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Reduce [stress](#)
- Improve fitness
- Lower blood pressure and heart rate
- Manage pain

Gentle yoga is practiced at a slower pace, with less intense positions, and usually including more time for meditation, breathing, and relaxation. It's a great choice for people who feel they are not fit or flexible enough to do all yoga poses, as well as for those with injuries, pain, impaired mobility, or health issues.

How it helps

In a non-placebo-controlled trial of 50 cancer caregivers, a gentle yoga-based stress reduction intervention failed to improve stress or anxiety but did reduce insulin resistance [\[R\]](#).

79



Buckwheat

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate buckwheat into your diet by adding it to meals 2-3 times per week. You can use buckwheat flour for pancakes or bread, include buckwheat groats in soups, salads, or as a side dish instead of rice or pasta.

Description

Buckwheat is a gluten-free whole grain that provides essential nutrients, including protein, fiber, and minerals. It can contribute to heart health, digestive regularity, and balanced nutrition.

How it helps

Buckwheat is rich in fiber and has a low glycemic index, meaning it can help regulate blood sugar levels and improve insulin sensitivity in the body. Consuming buckwheat can therefore reduce the risk of developing insulin resistance or help manage the condition.

In a non-placebo-controlled trial of 165 patients with type 2 diabetes, replacing a portion of staple food with tartary buckhwheat (at least 110 g/day) for 4 weeks lowered fasting insulin and insulin resistance [\[R\]](#).

80



Ursolic Acid

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 150-300 mg of ursolic acid supplement daily, preferably with food to enhance absorption. It can be continued for several weeks to months, but always consult with a healthcare provider before starting any new supplement regimen.

TYPICAL STARTING DOSE

150 mg

Description

Ursolic acid is a naturally occurring compound found in various fruits and herbs, including apple peels and holy basil. It is used for its potential to support muscle growth, reduce inflammation, and promote overall health through its antioxidant and anti-inflammatory properties.

How it helps

Supplementing with ursolic acid (150 mg/day) reduced insulin resistance (by 1.1) in a placebo-controlled trial of 24 patients with metabolic syndrome. In another study, ursolic acid, combined with resistance circuit training, improved insulin sensitivity and reduced inflammatory markers in older, obese women [\[R\]](#), [\[R\]](#).

Ursolic acid aids may help by enhancing insulin signaling, which improves the body's usage of glucose. It also helps reduce body fat.

81



Fasting Mimicking Diet

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Adopt a fasting mimicking diet for 5 consecutive days per month, consuming between 750 and 1,100 calories per day consisting mostly of plant-based soups, vegetables, nuts, seeds, and herbal teas. Ensure adequate hydration. Resume a normal, healthy diet for the remaining days of the month.

Description

The fasting mimicking diet is a dietary approach that involves cycles of fasting and calorie restriction to potentially promote longevity and metabolic health. It is currently an area of research interest for its possible health benefits.

How it helps

In a non-placebo-controlled trial of 40 patients with type 2 diabetes, following a fasting-mimicking diet for 6 months reduced insulin resistance, the albumin-to-creatinine ratio (only in patients with microalbuminuria), and soluble urokinase plasminogen activator receptor. In a non-placebo-controlled trial of 100 patients with type 2 diabetes, following a fasting-mimicking diet for 4 months lowered fasting glucose, 2-hour postprandial glucose, and HbA1c [\[R\]](#), [\[R\]](#).

This diet may help by 'resetting' your body, causing your cells to remove damaged parts and use them for energy. This can improve insulin sensitivity, leading to better blood sugar control.

82



Bifidobacterium Longum

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a Bifidobacterium longum supplement daily, with a typical dosage around 10 billion colony-forming units (CFUs). It can be consumed any time of day, but taking it with a meal might improve its absorption and effectiveness. Continue this regimen for at least 4 weeks to assess its benefits on digestive health.

TYPICAL STARTING DOSE
10 billion CFU

Description

Bifidobacterium longum is a beneficial probiotic strain known for its potential to support digestive health and boost the immune system.

[Bifidobacterium longum](#) is a [probiotic](#) bacterium naturally present in the human gastrointestinal tract. Its subspecies *B. longum subsp. infantis* is one of the earliest bacteria to colonize the infant gut [\[R\]](#).

People take *B. longum* to enhance immunity against infections and support gut health [\[R, R, R\]](#).

How it helps

Bifidobacterium Longum is a probiotic that improves your gut health and reduces inflammation. It may also help regulate blood sugar levels, potentially helping manage insulin resistance.

A total of 66 NASH patients were randomly and equally divided into two groups receiving Bifidobacterium longum with FOS and lifestyle modification (i.e., diet and exercise) versus lifestyle modification alone. Bifidobacterium longum with Fos and lifestyle modification, when compared to lifestyle modification alone, significantly reduces TNF, CRP, serum AST levels, insulin resistance, and fatty liver [\[R\]](#).

83



Glutathione supplements

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Take glutathione supplements orally, usually in pill or powder form, with a recommended dose ranging from 500mg to 1000mg daily, divided into two doses. It's best taken on an empty stomach or as directed by a healthcare professional. Continuous use is advised for sustained benefits, but consulting with a healthcare provider for personalized advice and duration is important.

Description

Glutathione (GSH) is your body’s strongest antioxidant. It has an enormous capacity to combat [oxidative stress](#) and neutralize harmful free radicals. Chemically speaking, glutathione is a tripeptide made up of 3 amino acids [\[R\]](#):

- [Glutamate](#)
- **Cysteine**
- [Glycine](#)

Low glutathione levels have been linked to cognitive decline, age-related disease, and general mortality among the elderly [\[R, R\]](#).

People take glutathione supplements to help with:

- Oxidative stress and detox
- Immune system support
- Skin aging and damage
- Exercise recovery
- Chronic diseases such as type 2 diabetes, Alzheimer's disease, Parkinson's disease, or COPD

How it helps

In a placebo-controlled trial of 10 patients with type 2 diabetes and 10 obese participants, supplementation with reduced glutathione (1000 mg/day) for 3 weeks increased insulin sensitivity [\[R\]](#).

84



Olive Leaf Extract

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 500-1000 mg of olive leaf extract daily, ideally in divided doses with meals. This regimen should be followed for at least 8 weeks to assess its effects on your health.

TYPICAL STARTING DOSE

500 mg

Description

Olive leaf extract is derived from the leaves of the olive tree and contains bioactive compounds such as oleuropein. It is believed to have various health benefits, including antioxidant and anti-inflammatory properties that may contribute to improved immune function and overall well-being.

How it helps

In a placebo-controlled trial of 46 overweight men, supplementation with olive leaf polyphenols (51.1 mg oleuropein and 9.7 mg hydroxytyrosol per day) for 12 weeks improved insulin sensitivity (by 15%) and pancreatic β -cell responsiveness (by 28%). Similarly, olive leaf extract (250 mg/day) taken as an add-on to a weight-loss diet for 8 weeks reduced insulin sensitivity in a placebo-controlled trial of 70 obese women [\[R\]](#), [\[R\]](#).

However, the combination of olive leaf, fenugreek, and bergamot extracts failed to improve blood sugar control in a placebo-controlled trial of 100 participants with prediabetes [\[R\]](#).

Olive leaf extract is rich in antioxidant compounds that may help with blood sugar control by reducing oxidative damage to the pancreas [\[R\]](#).

85



Lactobacillus Acidophilus NCFM

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

TYPICAL STARTING DOSE

10 billion CFU

Description

[Lactobacillus acidophilus](#) is a [probiotic](#) bacterium that has been traditionally and widely used in the dairy industry to make yogurt [\[R\]](#).

More recently, *L. acidophilus* has been used as a probiotic. People take it to help with [\[R, R, R, R\]](#):

- High cholesterol
- Gut diseases
- Allergies
- Vaginal infections

L. acidophilus NCFM is a specific strain that may help relieve diarrhea, improve gut health, and boost the immune system. It can be taken as a supplement or found in some yogurts and other fermented foods.

How it helps

In a placebo-controlled trial of 45 men with type 2 diabetes, supplementation with *Lactobacillus acidophilus* NCFM for 4 weeks preserved insulin sensitivity [\[R\]](#).

The combination of a diet richer in fruits and vegetables and supplementation with a synbiotic containing *L. acidophilus* NCFM and *Bifidobacterium lactis* HN019 decreased weight, fasting glucose, insulin resistance, insulin, and triglycerides better than either of these interventions alone in a non-placebo-controlled trial of 55 overweight or obese participants [\[R\]](#).

86



Chamomile

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take chamomile supplements in the form of capsules or tablets, usually ranging from 300 to 400 mg, up to three times daily between meals. If using chamomile tea as a supplement, drink 1 to 4 cups daily.

TYPICAL STARTING DOSE

300 mg

Description

Chamomile is an herbal remedy derived from the dried flowers of the chamomile plant. It is widely used for its calming and soothing properties

Chamomile is an herb native to Africa, Asia, and Europe. It was used as a traditional herbal remedy in ancient Greece, Rome, and Egypt. Today, chamomile is used in cosmetics, aromatherapy, tea, and supplements. It may help with [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Skin problems
- Period cramps
- Gut problems
- Sleep quality
- Mood

How it helps

Chamomile tea might help improve insulin resistance by reducing inflammation and blood sugar levels, as it contains antioxidant properties. However, more research is needed to confirm this impact; therefore, it should not substitute traditional diabetes treatment.

In a placebo-controlled trial of 64 subjects with type 2 diabetes, drinking chamomile tea (3 g/150 mL hot water) 3x/day after meals for 8 weeks lowered HbA1c, serum insulin, insulin resistance, total cholesterol, LDL cholesterol, triglycerides, and MDA [\[R\]](#), [\[R\]](#).

87



Chlorella

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 3 to 5 grams of chlorella in tablet or powder form daily, ideally before meals to improve digestion. Continue this supplementation for at least 2 to 3 months to observe benefits.

TYPICAL STARTING DOSE

3 g

Description

[Chlorella](#) is a microalga from freshwater. People consume chlorella in rice, pancakes, or tea. It can also be found as a supplement [\[R, R\]](#).

Chlorella is **rich in protein** and several micronutrients. It may be useful to [\[R, R, R, R, R, R, R, R\]](#):

- Reduce blood sugar
- Lower cholesterol
- Reduce blood pressure
- Improve immunity

How it helps

In 2 placebo-controlled trials of 146 patients with NAFLD, supplementation with chlorella (1200 mg/day), both alone and as an add-on to metformin and vitamin E, for 8 weeks lowered insulin resistance [\[R, R\]](#).

88



Fucoidan

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 300 mg of fucoidan supplement once daily, preferably with a meal to aid absorption. Continue this regimen for a minimum of four weeks to evaluate its effects on your health.

TYPICAL STARTING DOSE

300 mg

Description

Fucoidan is a compound found in certain brown seaweeds and marine plants, and it is consumed for its immune system support and anti-inflammatory effects.

How it helps

In a placebo-controlled trial of 25 overweight and obese participants, supplementation with fucoidan (500 mg/day) for 3 months increased insulin sensitivity, HOMA β -cell, and HOMA-IR, while decreasing systolic blood pressure and LDL cholesterol. However, the same treatment failed to improve insulin resistance in a placebo-controlled trial of 72 obese participants [\[R, R\]](#).

89



Eriocitrin

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Take 500 mg of eriocitrin supplement daily, with food or water. Continue this regimen for at least 8 weeks to evaluate its effects on your body.

TYPICAL STARTING DOSE

500 mg

Description

Eriocitrin is a flavonoid antioxidant found in citrus fruits, particularly lemon and lime. It has potential anti-inflammatory and antioxidant properties and may contribute to the health benefits associated with citrus consumption, such as improved immune function and skin health.

How it helps

Eriocitrin helps improve insulin resistance by boosting your body's response to insulin, helping it to better regulate blood sugar levels. It also has antioxidant properties, which can help protect your cells from damage caused by high blood sugar levels.

In a study with 30 subjects, Eriomin (200 mg/day) improved glycemic control by reducing blood glucose, insulin resistance, inflammation, and triglycerides, while increasing GLP-1. Placebo had fewer effects [\[R\]](#).

In a study with prediabetic patients, Eriomin at different doses (200, 400, and 800 mg) showed consistent effects, reducing various health markers including blood glucose, insulin resistance, inflammation, and improving factors like GLP-1 and antioxidant capacity [\[R\]](#).

90



Brown Seaweed And Bladderwrack

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Take a brown seaweed and bladderwrack supplement according to the product's instructions, typically around 500-1000 mg daily, with meals to reduce the risk of stomach upset. It's important to check the label for specific dosage recommendations. This supplement is usually taken for periods of up to two months followed by a break or as directed by a healthcare professional.

TYPICAL STARTING DOSE

500 mg

Description

Brown seaweed, such as kelp and wakame, is a nutrient-dense marine plant often used in Asian cuisine and dietary supplements. It's a natural source of essential minerals like iodine and may offer various health benefits, including thyroid support and potential antioxidant effects. Bladderwrack is a type of seaweed that has been used for its potential health benefits, including iodine content that supports thyroid function.

How it helps

In a placebo-controlled trial of 65 patients with poor blood sugar control, supplementation with bladderwrack and brown seaweed extract for 6 months lowered fasting blood glucose, postprandial blood glucose, and HbA1c [R].

A study with 23 participants found that taking a seaweed blend before consuming carbohydrates led to a 12.1% reduction in insulin levels and a 7.9% increase in insulin sensitivity, without affecting glucose response [R].

91



Eccentric Exercise

IMPACT1 / 5

EVIDENCE1 / 5

Description

Eccentric exercise is a type of exercise where the muscle lengthens as it contracts. It has been shown to have a number of health benefits, including increased muscle strength, improved bone density, and reduced risk of injury.

How it helps

Practicing eccentric exercise (30 min/day) for 8 weeks improved blood lipid profile, insulin resistance, and energy expenditure in a non-placebo-controlled trial of 20 women [R].

92



TUDCA (Tauroursodeoxycholic Acid)

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 250 to 1500 mg of TUDCA (tauroursodeoxycholic acid) per day, divided into two or three doses with meals. This recommendation is based on general guidelines from clinical studies; for specific conditions or as directed by a healthcare professional, dosages may vary.

TYPICAL STARTING DOSE
250 mg

Description

TUDCA is a bile acid derivative naturally produced in small quantities in the human body and also found in the bile of bears. It is often used as a supplement due to its potential to support liver health, reduce inflammation, and protect against bile acid buildup, making it valuable in managing liver conditions like cholestasis and certain liver diseases.

TUDCA, short for tauroursodeoxycholic acid, is a [bile acid](#) that naturally occurs in the body. It consists of ursodeoxycholic acid (UDCA) and taurine [\[R\]](#).

TUDCA is known for its liver-protective effects. People often use it as a dietary supplement to support liver health and promote overall well-being [\[R\]](#).

How it helps

In a [placebo-controlled trial of 20 obese subjects](#), supplementation with TUDCA (1750 mg/day) for 4 weeks **increased liver and muscle (but not fatty tissue) insulin sensitivity by 30%, as well as muscle insulin signaling** [\[R\]](#).

 PERSONALIZED TO YOUR GENES

People with your [SLCO1B](#) gene variant may absorb TUDCA better [\[R\]](#).

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
SLCO1B1	rs4149056	TC	

93



Berries

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate a variety of berries such as strawberries, blueberries, raspberries, and blackberries into your daily diet. Aim for at least one cup of fresh or frozen berries every day, either as a snack, part of your breakfast (such as in oatmeal or yogurt), or as a dessert.

Description

Berries, such as strawberries, blueberries, and raspberries, are packed with antioxidants, vitamins, and fiber. Regular consumption of berries may support heart health, improve cognitive function, and contribute to overall well-being.

How it helps

In a study involving 27 overweight men on a high-fat diet, blackberries (600 g/day, 1500 mg flavonoids for 7 days) increased fat oxidation, lowered insulin levels (reduced AUC to 6485 vs. 8245 $\mu\text{U}\cdot\text{min}/\text{mL}$), and improved HOMA-IR compared to a control group (GEL) [\[R\]](#).

Berries are low in sugar and high in antioxidants, which helps in managing blood sugar levels.

94



Aerobic Exercise (Cardio)

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Engage in at least 150 minutes of moderate-intensity aerobic exercise or 75 minutes of vigorous-intensity activity each week. Distribute this time over at least 3 days per week, avoiding consecutive days of vigorous exercise to allow for recovery.

TYPICAL STARTING DOSE

1 hour

Description

Engaging in regular aerobic exercise, such as running, swimming, or cycling, offers numerous health benefits, including improved cardiovascular fitness, weight management, and mood enhancement. It supports overall physical and mental well-being while reducing the risk of chronic diseases.

Cardio, short for cardiovascular exercise, is any type of physical activity that temporarily increases your heart rate. Examples include **running, cycling, swimming, and brisk walking**.

Regular cardio exercise has many benefits for your overall health. It can help lower your risk of heart disease and diabetes, support weight loss, and improve your mood and energy levels. To get the most out of cardio, try to do it for at **least 30 minutes, 3-5 times a week**.

Interval training is a type of cardio that combines periods of high-intensity training with brief rest periods.

How it helps

Aerobic exercise (cardio) improves insulin sensitivity because the cells in your body take up more glucose when you're physically active, which means your body doesn't need as much insulin to process it. More regular cardio also helps manage weight, a key factor in preventing and managing insulin resistance.

A [meta-analysis of 13 studies](#) concluded that aerobic exercise **significantly reduces HbA1c and HOMA-IR in prediabetic individuals** [\[R\]](#).

Another [meta-analysis \(11 studies\)](#) found that structured exercise programs **reduce insulin resistance, HbA1c, fasting glucose and insulin, and BMI in patients with type 2 diabetes** [\[R\]](#).

In overweight and obese youth, aerobic exercise (over 60 min/session, at least 3 sessions/week for 12 weeks) **decreases insulin (by 4.52µU/mL), HOMA-IR, fasting glucose, and body fat** according to [2 meta-analyses \(the largest one with 17 studies\)](#) [\[R\]](#), [\[R\]](#).

95

Low-Carbohydrate Diet

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Limit your daily intake of carbohydrates to less than 26% of your total daily calories. For a standard 2000-calorie diet, this means consuming no more than 130 grams of carbohydrates per day. Focus on including non-starchy vegetables, lean proteins, and healthy fats in your meals while minimizing the intake of sugars, bread, pasta, and other high-carb foods.

Description

Low-carbohydrate diets can promote weight loss, improve blood sugar control, and support heart health. They may also be beneficial for individuals with certain medical conditions, such as epilepsy or metabolic syndrome.

How it helps

Eating a low-carbohydrate, low-calorie diet may decrease insulin resistance more in people with certain gene variants [R].

PERSONALIZED TO YOUR GENES

Eating a low-carbohydrate, low-calorie diet may decrease insulin resistance more in people with your **ADIPOQ** gene variant [R].

GENE	SNP	GENOTYPE	EVIDENCE
ST6GAL1	rs1501299	GG	

96



Barberry

IMPACT

0 / 5

EVIDENCE

3 / 5

How to implement

Take a barberry supplement of 500-1000 mg daily, divided into two or three doses with meals for up to 12 weeks. Do not exceed the recommended dose without consulting a healthcare provider.

TYPICAL STARTING DOSE

500 mg

Description

Barberry is an herbal remedy used in traditional medicine for its potential to support digestive health and reduce inflammation. It contains compounds that may have antimicrobial and antioxidant properties.

How it helps

The combination of barberry has demonstrated positive effects on insulin resistance. A meta-analysis of 4 trials involving 491 patients with dyslipidemia showed that this combination reduced insulin resistance and fasting glucose. In a placebo-controlled trial of 136 obese individuals with type 2 diabetes, treatment with this combination for 6 months resulted in significant improvements in insulin resistance and various glycemic control parameters. However, a separate meta-analysis of 7 studies and 452 participants found that barberry supplementation alone lowered insulin levels but did not significantly affect fasting glucose, insulin resistance, or HbA1c [\[R\]](#), [\[R\]](#), [\[R\]](#).

Barberry may help in treating insulin resistance as it contains berberine, a compound known for its anti-diabetic properties, which can help improve insulin sensitivity and aid glucose metabolism.

97



Green Tea

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Consume 400 mg of green tea extract daily. This can be taken in the form of capsules or tablets available that specify the amount of green tea extract. Ensure the supplement is taken according to the product's specific instructions, usually once a day with water.

TYPICAL STARTING DOSE

400 mg

Description

Tea is a beverage made by steeping the leaves of the *Camellia sinensis* plant in hot water. It comes in various types, including black, green, white, and herbal teas, and is known for its diverse flavors and potential health benefits due to antioxidants and other bioactive compounds.

[Green](#) and black tea are made from the same plant (*Camellia sinensis*). This plant is processed in different ways to make each type of tea [\[R, R\]](#).

Tea contains antioxidants called **flavonoids**, which may help prevent [\[R, R, R, R\]](#):

- Heart disease
- Cancer
- Diabetes

How it helps

Green tea is rich in polyphenols and has been found to improve insulin activity.

98



Yerba Mate

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take yerba mate as a supplement by consuming 1 to 3 grams of the dried leaves in capsule form daily, or by drinking 1 to 3 cups of yerba mate tea. Do this consistently for at least 4 to 8 weeks to observe potential benefits.

TYPICAL STARTING DOSE

1 g

Description

Yerba mate is a South American herbal tea known for its caffeine content and antioxidant properties. It provides a boost in alertness and mental clarity and is used for its potential to enhance focus and energy.

Yerba mate is a traditional South American beverage made from the dried leaves of the yerba mate plant (*Ilex paraguariensis*). It is commonly consumed in countries like Argentina, Uruguay, Paraguay, and Brazil, and has a long history of cultural significance and social bonding.

Yerba mate is traditionally sipped through a *bombilla*, a special metal straw, from a gourd-shaped container. This results in a flavorful and stimulating drink often shared among friends and family.

How it helps

Yerba Mate has compounds that can boost insulin signaling and lower blood sugar, making it beneficial for managing insulin resistance. Additionally, some studies indicate it may improve weight and fat loss, which are crucial in managing this condition.

99



Whey Protein

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Mix one scoop (approximately 25-30 grams) of whey protein powder with 8-12 ounces of water, milk, or your preferred beverage. Consume this drink 1-2 times per day, ideally post-workout or as a meal replacement.

TYPICAL STARTING DOSE

25 g

Description

Whey protein is a complete protein derived from milk during cheese production. It is rich in essential amino acids and is used to support muscle recovery, promote muscle growth, and provide a convenient protein source for athletes and fitness enthusiasts.

Whey is the liquid that separates from milk when cheese is made. [Whey protein](#) is full of amino acids (protein building blocks) that the body needs [\[R\]](#), [\[R\]](#).

Whey protein usually comes in the form of a powder that can be added to soft foods and drinks. People often use it to help with [\[R\]](#), [\[R\]](#):

- Athletic performance
- Nutritional deficiencies

How it helps

Whey protein stimulates the production of the hormone insulin, which helps regulate blood sugar, and it improves the cells' response to this hormone. Both of these factors can reduce insulin resistance, making it easier for your body to process glucose effectively.

100



L-Lysine

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take an L-lysine supplement of 1,000 to 1,500 mg per day, divided into two or three doses, with meals to avoid stomach upset. This regimen can be ongoing for individuals looking to support general health or for specific conditions as advised by a healthcare provider.

TYPICAL STARTING DOSE

1000 mg

Description

A **lysine supplement** of 38 mg/kg/d can be taken to meet daily needs not achieved through diet. This typically is in the form of L-lysine and comes in tablets from 500-1000mg.

How it helps

L-Lysine can potentially improve insulin resistance by aiding in glucose uptake and utilization in cells, contributing to better blood sugar control. However, more research is needed to fully confirm these effects and you should always consult with your healthcare provider before starting new supplements.

101



Practice Exercise Snacks

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Integrate short bursts of physical activity, each lasting about 1 to 2 minutes, into your daily routine at least two to three times a day. These 'exercise snacks' can include activities like doing a set of stairs, rapid bodyweight exercises, pull-ups, push-ups, sit-ups, or brisk walking.

TYPICAL STARTING DOSE

1 minutesute

Description

Staying physically active is essential for maintaining overall health and well-being. **Exercise snacks** are brief, frequent bursts of physical activity integrated into daily routines, helping combat the health risks associated with prolonged sitting and sedentary behavior, such as obesity and cardiovascular issues. Examples include taking the stairs or doing quick exercises during work breaks.

Staying active can do wonders for your health. It can help you lose weight, improve your heart health, boost your mood, and more [\[R\]](#).

Exercise snacks are short, quick bursts of physical activity performed throughout the day, designed to break up prolonged periods of sitting or inactivity. These brief bouts of exercise can be as short as a few minutes and are incorporated into daily routines to boost overall physical activity levels.

Exercise snacks are crucial for health because they combat the negative effects of sedentary behavior, such as prolonged sitting, which is associated with an increased risk of obesity, cardiovascular diseases, diabetes, and musculoskeletal issues. They help improve blood circulation, regulate blood sugar levels, and enhance mood and cognitive function.

Examples of exercise snacks include taking the stairs instead of the elevator, doing a few minutes of bodyweight exercises (e.g., squats or push-ups) during work breaks, or walking briskly for a few minutes after meals. These short, frequent bursts of activity contribute to a more active lifestyle and can significantly benefit overall health by reducing the risks associated with excessive sitting.

How it helps

Regular physical activity improves body’s ability to use insulin and helps regulate glucose levels in the blood.

102



Ginkgo

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take 120 mg of Ginkgo supplement daily, preferably with meals to aid absorption. This dosage is typically split into two 60 mg doses taken in the morning and evening for best results.

TYPICAL STARTING DOSE

120 mg

Description

[Ginkgo](#) (*Ginkgo biloba*) is an ancient tree used in traditional Chinese medicine [\[R\]](#), [\[R\]](#).

According to limited evidence, ginkgo leaf extract may help with [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Anxiety
- Dementia
- Eye problems
- Blood vessel problems
- Vitiligo

How it helps

Ginkgo may help decrease insulin resistance by supporting blood flow and reducing inflammation. This can make it easier for cells to take in glucose, which is crucial for people with insulin resistance.

103



Blueberries

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate a half to one cup of fresh or frozen blueberries into your daily diet. You can add them to your breakfast cereal, smoothies, or enjoy them as a snack on their own.

Description

Blueberries are a nutritious fruit packed with antioxidants, vitamins, and fiber. They are known for their potential to support brain health, reduce the risk of chronic diseases, and promote overall well-being.

[Blueberries](#) are enjoyed all around the world for their sweet taste and nutritional benefits. They may support [\[R\]](#):

- Heart health
- Cognitive function
- Normal blood sugar levels

How it helps

Blueberries are packed with anthocyanins, a type of antioxidant that improves insulin sensitivity and reduces blood sugar levels. So, it helps in managing Insulin Resistance and potentially preventing it from developing.

104



Aloe Vera

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take a 50 mg Aloe vera supplement daily, with a glass of water, preferably at the same time each day to maintain consistency.

TYPICAL STARTING DOSE

50 mg

Description

Aloe vera is a succulent plant native to arid regions and contains a gel-like substance in its leaves that is rich in vitamins, minerals, and antioxidants, making it beneficial for soothing skin irritations, promoting wound healing, and providing relief from conditions such as sunburn and minor burns. The primary active compounds in aloe vera gel include polysaccharides, vitamins like vitamin C and E, and minerals such as zinc, which contribute to its healing and anti-inflammatory effects.

[Aloe vera](#) lives in the desert, and its thick leaves store water in the form of a gel [\[R\]](#).

People use aloe gel to help soften the skin and soothe burns [\[R\]](#).

Oral aloe supplements may help with blood sugar and gut health [\[R\]](#).

How it helps

Aloe Vera has components that can enhance insulin sensitivity and aid in the regulation of blood sugar levels. Consuming it could therefore potentially be beneficial in managing insulin resistance.

105



Chia Seeds

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate 1 to 2 tablespoons of chia seeds into your daily diet. You can add them to yogurt, smoothies, oatmeal, or salads. Do this regularly as part of your daily meals.

Description

Chia seeds are high in fiber, omega-3 fatty acids, and various vitamins and minerals. Adding chia seeds to your diet can support digestive health, provide essential nutrients, and contribute to overall nutritional wellness.

Chia seeds are a healthy source of omega-3s, calcium, as well as fiber, iron, magnesium phosphorus, and vitamins B1 and B3. A 1-ounce serving provides 5.06 g of ALA.

How it helps

Chia seeds are rich in fiber, which can slow the rate at which sugar is absorbed into the blood and reduce spikes in blood sugar levels, thus improving insulin sensitivity. Moreover, their high content of omega-3 fatty acids may help lower triglyceride levels, reducing insulin resistance and potentially preventing its occurrence.

106



Chromium

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take a 200 mcg chromium supplement daily, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

200 mcg

Description

Chromium is a trace mineral that plays a role in insulin sensitivity and glucose metabolism. Adequate chromium intake through diet or supplements may help support blood sugar control and overall metabolic health.

[Chromium](#) (Cr) is a trace element. It helps regulate carb, fat, and protein breakdown [\[R\]](#).

Women need 20-25 micrograms (mcg) of chromium per day, while men need 30-35 mcg [\[R\]](#).

It’s easy to get chromium from your diet. Good sources include [\[R\]](#):

- Grape and orange juice
- Ham
- Beef
- Lettuce

You can also get chromium from supplements [\[R\]](#).

How it helps

Chromium supplementation may improve insulin resistance by enhancing insulin receptor activity.

107



Regular Sleep Schedule

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Go to bed and wake up at the same time every day, even on weekends and holidays. This helps regulate your body's internal clock, leading to better sleep quality. Aim for 7-9 hours of sleep per night.

Description

Maintaining a regular sleep schedule involves going to bed and waking up at consistent times each day. This practice helps regulate the body's internal clock and promotes better sleep quality, mood, and cognitive function.

How it helps

Maintaining a consistent sleep pattern can regulate circadian rhythms, which in turn helps in managing blood sugar levels and insulin sensitivity.

108



Legumes

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate a serving of legumes, such as beans, lentils, chickpeas, or peas, into your diet at least four times a week. A serving size is approximately half a cup cooked. Ensure to prepare them properly by soaking and rinsing beans, if applicable, to reduce anti-nutrients and improve digestibility.

Description

Legumes, such as beans, lentils, and chickpeas, are excellent sources of plant-based protein, fiber, and various vitamins and minerals. Including legumes in your diet can promote satiety and support digestive health.

Legumes are plants from the *Fabaceae* family. Their edible seeds are called **pulses**. Legumes are important food staples and sources of carbohydrates, fiber, protein, iron, and other key nutrients.

Common legumes include:

- Peanuts
- Beans
- Chickpeas
- Peas
- Lentils

How it helps

Legumes are high in fiber and protein, which can help maintain blood sugar levels and improve insulin sensitivity.

109



Spirulina

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take 1-8 g of spirulina supplements daily, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

500 mg

Description

Spirulina is a blue-green algae. It is rich in nutrients like protein, vitamins, and minerals, particularly vitamin B12 and iron, and is a source of antioxidants, chlorophyll, and phycocyanin. It can be found in powdered or tablet form as a supplement, and is often used to boost energy, support the immune system, and enhance overall nutrition. Additionally, spirulina.

[Spirulina](#) is a supplement made from blue-green algae that grows in fresh and marine water [\[R, R\]](#).

Dried spirulina is up to 70% protein. It’s also rich in vitamins, antioxidants, and healthy fats. This makes it a great source of nutrition for both people and livestock [\[R, R, R\]](#).

People use spirulina supplements to reduce [\[R, R\]](#):

- Cholesterol
- Blood pressure
- Blood sugar

How it helps

Spirulina, an algae rich in nutrients, can increase insulin sensitivity and reduce blood sugar levels, thus aiding in the management of insulin resistance. It has anti-inflammatory and antioxidant effects that may help decrease inflammation associated with insulin resistance.

110



Dietary Vitamin A

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Include foods high in vitamin A in your daily diet, such as sweet potatoes, carrots, spinach, and fortified foods like milk. Aim for 700-900 micrograms (mcg) of vitamin A per day for adults, depending on your age and sex, with a slightly higher intake recommended for women who are pregnant or breastfeeding.

Description

Vitamin A is essential for maintaining healthy vision, immune function, and skin integrity. It also plays a role in cell differentiation and growth, supporting various bodily functions.

How it helps

Dietary Vitamin A can help with insulin resistance since it plays a vital role in pancreas cell health, affecting both insulin secretion and blood sugar regulation. In essence, adequate intake of Vitamin A can potentially improve insulin sensitivity and hence manage insulin resistance.

111



Histidine

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take 500-1000 mg of histidine supplement per day, ideally with a meal. It is best to start with a lower dose, such as 500 mg, to assess tolerance and then adjust as needed up to 1000 mg. Consistent daily intake for at least 4 to 8 weeks may be necessary to notice benefits.

TYPICAL STARTING DOSE

500 mg

Description

Histidine is an essential amino acid that plays a role in protein synthesis and the formation of histamine. It is important for overall health and is found in various protein-rich foods.

A histidine supplement of up to 14 mg/kg/d can be taken to meet the needs not achieved through diet.

You can also increase your dietary histidine intake. Histidine is found in protein-rich foods such as meat, chicken, fish, beans, oats, and wheat. It's especially high in the Japanese food ingredient dashi or dried bonito, often used for soup stock [R].

How it helps

Histidine may help improve insulin resistance by enhancing insulin activity, therefore aiding blood glucose control. However, more research is needed to confirm this benefit.

112



Dietary Vitamin E

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate foods high in Vitamin E into your daily diet. This includes almonds, hazelnuts, sunflower seeds, and green leafy vegetables such as spinach and broccoli. Aim for a daily intake of 15mg of Vitamin E from your diet, which is roughly a handful of almonds (about 23 almonds) or 2 tablespoons of sunflower seeds.

Description

Dietary vitamin E is a fat-soluble antioxidant vitamin found in nuts, seeds, and vegetable oils. It helps protect cells from oxidative damage and supports immune function.

[Vitamin E](#) is an antioxidant important for the immune system and for heart health [\[R\]](#).

Plant-based foods have the most vitamin E. These include [\[R\]](#):

- Wheat germ
- Sunflower seeds
- Almonds
- Plant oils

Adults need about **15 mg** of vitamin E per day [\[R\]](#).

How it helps

Dietary Vitamin E helps improve insulin sensitivity by combating oxidative stress, thus helping regulate sugar levels in the body. Having adequate amounts in your diet can help prevent insulin resistance by protecting cells from damage and ensuring they operate correctly.

Genetically higher vitamin E appears to be inversely associated with type 1 diabetes and insulin resistance [\[R\]](#).

113



Bladderwrack

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take 300-500 mg of bladderwrack supplement daily, preferably with meals to enhance absorption. It's recommended to start with the lower dose and gradually increase if needed. Consult with a healthcare provider before beginning, especially if you are pregnant, nursing, or have a medical condition like hyperthyroidism.

TYPICAL STARTING DOSE

300 mg

Description

Bladderwrack is a type of seaweed that has been used for its potential health benefits, including iodine content that supports thyroid function.

How it helps

A study with 23 participants found that taking a seaweed blend before consuming carbohydrates led to a 12.1% reduction in insulin levels and a 7.9% increase in insulin sensitivity, without affecting glucose response [\[R\]](#).

Bladderwrack contains a type of fiber called fucoidan, which has been found to increase insulin sensitivity.

114



Melatonin

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take 500 mcg of melatonin orally, about 30 minutes before bedtime, to help with sleep. It can be taken daily as needed.

TYPICAL STARTING DOSE

500 mcg

Description

Melatonin is a natural hormone produced by the pineal gland in the brain that helps regulate the sleep-wake cycle. It plays a crucial role in promoting sleep onset and maintaining a consistent sleep pattern, making it a commonly used supplement for managing sleep disorders and jet lag.

[Melatonin](#) is an important sleep hormone. Bright light at night may prevent your body from making enough melatonin [\[R\]](#), [\[R\]](#), [\[R\]](#).

Your body makes melatonin on its own. However, some people take melatonin supplements to help them sleep. It may help with jet lag in particular [\[R\]](#), [\[R\]](#), [\[R\]](#).

How it helps

Melatonin helps regulate the body's internal clock and can improve sleep patterns, which is important as inadequate sleep can worsen insulin resistance. Furthermore, some studies suggest that melatonin may directly influence insulin secretion and glucose metabolism, although the exact mechanisms are not fully understood.

115



Brown rice

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Replace white rice with brown rice in your meals. Aim to consume brown rice 3-4 times a week, incorporating it into dishes such as stir-fries, salads, or as a side to your main protein source. Start with a serving size of about 1/2 to 1 cup of cooked brown rice per meal.

Description

Brown rice is a whole grain rich in fiber, vitamins, and minerals. It provides sustained energy, supports digestive health, and contributes to overall nutritional well-being.

Brown rice contains a host of B-vitamins including thiamine, and minerals like magnesium, phosphorus, manganese, and selenium. A ½ cup serving provides 0.1 mg of thiamine or 8%DV.

How it helps

Brown rice has a lower glycemic index than white rice, which can help control blood sugar levels.

116



Dietary Omega-3 Fatty Acids

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate foods high in omega-3 fatty acids into your diet daily. This includes eating fish such as salmon, mackerel, and sardines at least twice a week. Alternatively, include a tablespoon of flaxseed oil or chia seeds in your daily diet.

Description

[Omega-3 fatty acids](#) are some of the healthiest fats we can eat. They help lower inflammation and protect the heart, brain, and eyes. Our bodies produce less omega-3s than we need for optimal health, so it's important to get enough through food or supplements [\[R\]](#), [\[R\]](#), [\[R\]](#).

There are three major types of omega-3s: ALA, EPA, and DHA. **EPA and DHA are vital for mental and heart health** [\[R\]](#), [\[R\]](#), [\[R\]](#).

Fatty fish are rich in EPA and DHA. They include [\[R\]](#):

- Salmon
- Tuna
- Herring
- Sardines

For optimal health, try to get at least **two servings of fatty fish per week**. Fish oil supplements are available for those who don't eat fish regularly [\[R\]](#).

How it helps

Omega-3s found in fish and flaxseeds can reduce inflammation and potentially improve insulin sensitivity.

117



Coenzyme Q10 (CoQ10)

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take a 100 mg Coenzyme Q10 (CoQ10) supplement once daily with a meal that contains fat for better absorption.

TYPICAL STARTING DOSE

100 mg

Description

Coenzyme Q10 (CoQ10) is a naturally occurring antioxidant that plays a crucial role in cellular energy production. It is often taken as a supplement to support heart health, improve energy levels, and provide antioxidant protection, especially for individuals with certain medical conditions or as they age.

[Coenzyme Q10](#) (CoQ10) is a compound that helps enzymes work better. By doing so, CoQ10 helps improve [R](#), [R](#), [R](#), [R](#):

- Energy levels
- Antioxidant protection
- Heart health
- Muscle strength
- Blood sugar control

The amount of CoQ10 made by your body decreases as you get older. Luckily, you can also get it from food or supplements. Good sources of CoQ10 include [R](#), [R](#):

- Organ meats
- Fatty fish
- Whole grains

How it helps

Coenzyme Q10 (CoQ10) helps the cells produce energy, which is vital for managing insulin resistance. Essentially, by boosting energy production in cells, CoQ10 can improve insulin sensitivity and lower blood sugar levels.

118



Garlic

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate 1-2 cloves of raw garlic into your meals daily. This can be achieved by finely chopping or crushing the garlic and letting it sit for a few minutes before adding it to your dishes to maximize its health benefits.

Description

Garlic is a popular herb known for its potential cardiovascular benefits, including lowering blood pressure and cholesterol levels. It also possesses antimicrobial properties and may support immune function.

[Garlic](#) is a vegetable often used to flavor food. It’s been a part of traditional medicine for thousands of years [\[R\]](#).

Today, people take garlic to help control their blood pressure and cholesterol [\[R\]](#).

How it helps

Garlic helps improve insulin resistance by triggering the release of insulin and regulating blood sugar levels. Its antioxidants and anti-inflammatory properties also strengthen your body's immune system and protect against damage caused by high blood sugar.

119



Ascophyllum Nodosum

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take 100-200 mg of Ascophyllum nodosum extract daily with water. It is suggested to take this supplement in the morning to potentially benefit from its effects throughout the day. Continue daily use for at least 8-12 weeks to observe benefits.

TYPICAL STARTING DOSE

100 mg

Description

Ascophyllum nodosum is a type of brown seaweed commonly known as knotted wrack. It's used in various industries, including agriculture, cosmetics, and food production. In cosmetics, extracts of Ascophyllum nodosum are incorporated into skincare products for their moisturizing, antioxidant, and anti-inflammatory properties. Additionally, it's used as a food additive and supplement for its potential health benefits, such as improving thyroid function and supporting overall well-being.

How it helps

A study with 23 participants found that taking a seaweed blend before consuming carbohydrates led to a 12.1% reduction in insulin levels and a 7.9% increase in insulin sensitivity, without affecting glucose response [\[R\]](#).

Please note: *There is no evidence from controlled clinical trials to support this recommendation. It is included based on uncontrolled clinical trials, animal or cell studies, or non-scientific criteria. Please take this recommendation with a grain of salt until more research is available.*

120



Green Tea Extract

IMPACT0 / 5

EVIDENCE0 / 5

How to implement

Take a green tea extract supplement containing 250-500 mg of EGCG (the active compound in green tea) daily, preferably with a meal to enhance absorption. This dosage is typically split into two separate doses, taken in the morning and later in the day. Continue this regimen for at least three months to observe potential health benefits.

TYPICAL STARTING DOSE

250 mg

Description

Green tea extract is a concentrated form of the beneficial compounds found in green tea, such as catechins. It is used in dietary supplements for its potential to enhance metabolism, aid in weight management, and provide antioxidant protection.

[Green tea](#) is made from the same plant as black tea (*Camellia sinensis*). However, the leaves and buds are processed differently [\[R\]](#).

Green tea contains **catechins**. These are antioxidants that help prevent [oxidative stress](#) [\[R\]](#).

EGCG is the main catechin found in green tea. It may help reduce inflammation and support weight loss [\[R\]](#).

How it helps

Green tea extract contains catechins which may increase insulin activity and improve glucose metabolism.

121



Avocado

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate half to one whole avocado into your daily diet. You can add it to salads, sandwiches, or use it as a healthy fat substitute for spreads or dressings.

Description

Avocado is a nutrient-dense fruit known for its creamy texture and healthy monounsaturated fats. It is packed with vitamins, minerals, and dietary fiber, and may support heart health, skin health, and overall nutrition.

[Avocado](#) is a fruit first cultivated in Mexico in 500 BCE [\[R\]](#), [\[R\]](#).

You can eat it raw in salads, sandwiches, and dips. Avocado oil has recently become popular, but it’s much less nutritious than the whole fruit.

Avocado is rich in antioxidants, vitamins, minerals, and fiber. It may support [\[R\]](#):

- Heart health
- Healthy weight
- Healthy aging

How it helps

Avocados are rich in monounsaturated fats that can help improve insulin sensitivity.

122



Quinoa

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate quinoa into your diet by replacing rice or pasta with it in meals. Aim for 1-2 servings, which is about 1/2 to 1 cup cooked, 2-3 times a week to benefit from its high protein, fiber, and mineral content.

Description

Quinoa is a nutrient-rich, gluten-free grain-like seed originating from South America. It is packed with protein, fiber, B-vitamins, vitamins A, C, and E, as well as minerals like calcium phosphorus, iron, and zinc, making it a valuable addition to diets for promoting muscle health, aiding digestion, and providing essential nutrients.

[Quinoa](#) (*Chenopodium quinoa Willd*) is a flowering plant native to The Andes in South America. There, it is a **food staple for indigenous cultures** [\[R\]](#), [\[R\]](#), [\[R\]](#).

Quinoa is famous for its seeds, which are **gluten-free and high in protein**. In comparison with many grains, quinoa seeds have a greater amount of many nutrients, including [\[R\]](#), [\[R\]](#):

- Fiber
- [Fatty acids](#) (e.g., linoleic and α-linolenic acid)
- Vitamins (e.g., B1, B2, B6, C, and E)
- Minerals (e.g., calcium, phosphorus, iron, and zinc)

Quinoa seeds can be used whole or ground to a fine powder and shaped into flakes before use [\[R\]](#).

How it helps

Quinoa has a low glycemic index and is rich in fiber and protein, which helps control blood sugar levels.

123



Ginger

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take a 500 mg ginger supplement daily, preferably with a meal to enhance absorption and minimize potential stomach discomfort.

TYPICAL STARTING DOSE

500 mg

Description

Ginger is a versatile spice known for its potential anti-inflammatory and digestive benefits. It may help alleviate nausea, reduce muscle soreness, and support gastrointestinal comfort when consumed as part of a balanced diet.

[Ginger root](#) is a cooking spice and a traditional remedy. People mostly use it to relieve [\[R\]](#):

- Nausea
- Menstrual cramps
- Joint pain

How it helps

Ginger can enhance insulin sensitivity, making it easier for your body to absorb and use the insulin it produces. This can result in lower blood sugar levels, which can benefit people with insulin resistance.

124



Flaxseed

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Consume 2 tablespoons of ground flaxseed daily. You can add it to your breakfast cereal, smoothies, or salads.

TYPICAL STARTING DOSE

2 tbsp

Description

Flaxseed is a nutrient-dense food that's high in fiber and omega-3 fatty acids. It may contribute to heart health, promote digestive regularity, and help manage cholesterol levels when included in a balanced diet.

[Flaxseed](#) is a common ingredient in bakery products. Some people also use it as a health food to support digestion [\[R\]](#).

Flaxseed is rich in many compounds, including [\[R\]](#):

- Vitamins and minerals
- Protein
- Fiber
- Omega-3 fatty acids ([ALA](#))

How it helps

Flaxseeds are rich in fiber and omega-3 fatty acids, which can improve insulin sensitivity by slowing down digestion and regulating blood sugar levels. Regular consumption of flaxseeds can help prevent insulin resistance by promoting better utilization of glucose in the body.

125



Almonds

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate a handful of almonds (about 23 kernels) into your daily diet. You can eat them as a snack, add them to your breakfast cereals or yogurt, or include them in salads and other dishes. Do this consistently for ongoing health benefits.

Description

Almonds are a good source of omega-6s, protein and vitamins, making for a great snack food. A 1-ounce serving provides 3700 mg of omega-6.

Almonds are nutritious tree nuts that originate from the *Prunus dulcis* tree. They are packed with essential nutrients, including healthy fats, fiber, vitamin E, and magnesium, which collectively contribute to heart health, support weight management, and may help regulate blood sugar levels.

How it helps

Almonds are high in magnesium, which can improve insulin sensitivity by playing a role in glucose metabolism.

126



Whole Grains

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate at least three servings of whole grains into your daily diet. This can include consuming foods such as whole grain bread, brown rice, whole grain pasta, and oats. Aim to replace refined grains with whole grains at each meal for optimal benefits.

Description

Whole grains encompass a variety of grains like wheat, oats, and quinoa, where the entire grain kernel is intact. They are rich in fiber, vitamins, minerals, and antioxidants, supporting heart health and reducing the risk of chronic diseases.

Unlike refined grains, whole grains contain nutritious parts of the grain like bran and germ.

Whole grains provide many crucial nutrients, including:

- Fiber
- B-vitamins
- Iron
- Magnesium
- Phosphorus

Due to their high fiber content, whole grains don’t tend to spike blood sugar like refined grains do.

How it helps

Whole grains have more nutrients and fiber, which slow the digestion of carbohydrates and improve insulin sensitivity.

127



Good Oral Hygiene

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Brush your teeth at least twice a day for two minutes each time using fluoride toothpaste. Floss daily to remove plaque from places your toothbrush can't reach and consider using mouthwash. Visit your dentist at least twice a year for professional cleanings and checkups.

TYPICAL STARTING DOSE

2 minutes

Description

Good oral hygiene, which includes regular brushing, flossing, and dental check-ups, is crucial for preventing tooth decay, gum disease, and maintaining overall oral health. A healthy mouth contributes to overall well-being and can prevent dental issues that may impact systemic health.

Oral hygiene refers to practices that keep the mouth healthy. Good habits include [R](#), [R](#):

- Gently brushing the teeth and tongue for two minutes, at least twice a day
- Flossing daily
- Using a toothpaste with fluoride and a soft toothbrush
- Replacing a worn toothbrush at least every 3 months

To help maintain good oral hygiene, it is also important to regularly see dental professionals. They can help prevent and address issues with your teeth and gums.

How it helps

Good oral hygiene prevents inflammation in the mouth due to gum disease making the body more sensitive to insulin. Less insulin is then needed, reducing insulin resistance.

128



Bilberry

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate bilberry fruits into your diet by eating a small handful, approximately 1/4 to 1/2 cup, daily. You can also consume bilberry in the form of tea, by steeping 1-2 teaspoons of dried bilberries in hot water for about 10 minutes, up to three times a day.

Description

Bilberry is a fruit rich in antioxidants and flavonoids, which may contribute to eye health and circulatory function. It's often used in supplements for its potential to support vision and overall well-being.

How it helps

Bilberry is abundant in antioxidants, particularly anthocyanins, which can enhance insulin sensitivity and thereby help manage insulin resistance. Moreover, these antioxidants fight inflammation and oxidative stress, which are key contributors to the development of insulin resistance.

129



Fenugreek

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take a 500 mg fenugreek supplement daily, preferably with a meal to aid in digestion and absorption.

TYPICAL STARTING DOSE

500 mg

Description

Fenugreek is an herb and spice commonly used in traditional medicine for its potential to support digestive health, regulate blood sugar levels, and promote lactation in nursing mothers. Its compounds, such as soluble fiber and fenugreek seeds, contribute to its various health benefits.

[Fenugreek](#) is a leafy green legume originating from central Asia. Its leaves and seeds are both used in cooking. Some people also use the seeds to make tea [[R](#), [R](#)].

People use fenugreek tea or supplements for [[R](#), [R](#), [R](#), [R](#)]:

- Reproductive health
- Blood sugar control
- Decreasing cholesterol

How it helps

Fenugreek is high in soluble fiber which can help slow down the absorption of carbohydrates and sugar in your body, therefore improving your blood sugar levels. This can help your body improve its insulin sensitivity and potentially prevent insulin resistance.

130



Paleo Diet

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Adopt a diet that includes lean meats, fish, fruits, vegetables, nuts, and seeds, resembling the diet of our hunter-gatherer ancestors. Exclude all dairy products, legumes, grains, added sugar, and processed foods. This should be a consistent dietary approach, not a short-term diet, to observe its benefits on health and well-being.

Description

The paleo diet, also known as the caveman diet, emphasizes whole foods such as lean meats, fish, fruits, vegetables, nuts, and seeds while excluding processed foods, grains, and dairy. It is believed to support weight management and reduce the risk of chronic diseases by focusing on foods more in line with our ancestors' diets.

How it helps

The Paleo Diet, rich in lean proteins, fruits, vegetables, and healthy fats, reduces your intake of processed foods and sugars, which promote insulin resistance. By doing so, it helps sensitize your body's response to insulin, hence potentially preventing insulin resistance.

131



Vegetables

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate at least 2-3 cups of various vegetables into your daily diet, ensuring a mix of colors like greens, reds, and yellows to maximize nutrient intake. Aim to include vegetables in most meals, either as a side, part of the main dish, or snacks.

Description

Vegetables are edible parts of plants that offer various health benefits due to their rich nutrient content, including vitamins, minerals, fiber, and antioxidants. They are essential components of a balanced diet and contribute to overall health, supporting various bodily functions.

How it helps

Non-starchy vegetables are low in calories and carbohydrates, and high in fiber, aiding in glucose control.

132



Meditation

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Set aside 10-20 minutes each day in a quiet space without distractions to practice meditation. Focus on your breath or perform guided meditation using an app or audio track.

TYPICAL STARTING DOSE

30 minutes

Description

Meditation is a mindfulness practice that can reduce stress, improve mental clarity, and promote relaxation. Regular meditation is associated with numerous mental and emotional health benefits, including reduced anxiety and enhanced emotional well-being.

[Meditation](#) is a relaxation technique that trains your mind to focus and redirect your thoughts. Some of the main types of meditation are [\[R\]](#):

- Mindfulness
- Focused
- Transcendental
- Mantra
- Moving

People use meditation to improve [\[R\]](#), [\[R\]](#):

- Stress and anxiety
- Mood
- Sleep disturbances
- Pain

How it helps

Meditation can improve insulin resistance by lowering stress levels, which reduces cortisol, a hormone that can interfere with insulin function. Consistent practice of meditation also contributes to weight loss and decreased belly fat, factors that can substantially reduce insulin resistance.

133



Goji Berries

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate goji berries into your daily diet by adding a handful (about 1 ounce or 28 grams) to your morning cereal, yogurt, or smoothie. You can also snack on dried goji berries throughout the day. Aim to include them in your diet consistently for at least a month to observe potential health benefits.

Description

Goji berries are a nutritious fruit known for their high antioxidant content. They may support immune health, provide essential nutrients, and be incorporated into a healthy diet as a snack or ingredient.

How it helps

Goji berries can help with insulin resistance by enhancing the body’s sensitivity to insulin, thus reducing the amount of insulin needed. Additionally, they are high in dietary fiber which slows sugar absorption and helps to prevent spikes in blood sugar.

134



Carob

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take 1 to 2 teaspoons (approximately 5 to 10 grams) of carob powder daily. It can be mixed into water, a smoothie, or sprinkled on foods such as yogurt or cereal. Continue this practice daily as part of your dietary supplement routine.

TYPICAL STARTING DOSE

5 g

Description

Carob is a nutritious and caffeine-free alternative to chocolate. It's often used in culinary applications and can be a part of a healthy diet as it contains vitamins, minerals, and dietary fiber.

How it helps

Carob is high in fiber and phenolic compounds, which can slow the digestion of carbohydrates and aid in controlling blood sugar levels. This may in turn increase insulin sensitivity and potentially improve insulin resistance.

135



Keto Diet

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Adopt a diet that consists of about 70-80% fat, 10-20% protein, and 5-10% carbohydrates. Eliminate or significantly reduce the intake of sugar and starches like bread, pasta, rice, and potatoes, focusing instead on high-fat foods like meats, fatty fish, eggs, butter, and healthy oils, as well as low-carb vegetables like leafy greens. This dietary pattern should be maintained consistently for a period of at least 3-4 weeks to achieve ketosis, after which it can be adjusted based on individual goals and responses.

Description

The keto diet is a high-fat, low-carbohydrate eating plan designed to induce a state of ketosis in the body, where it primarily burns fat for energy. It is often used for weight loss and managing certain medical conditions.

The ketogenic diet, or the ‘keto’ diet, is rich in fat and restricts carb intake [\[R\]](#), [\[R\]](#).

On the ketogenic diet, 50 g of carbs or less are consumed per day. Around 55-80% of the calories come from fat [\[R\]](#).

The ketogenic diet depletes the body of sugars like glucose. When people fast or eat very little carbs, the body makes less insulin. In response, the body starts using fat for energy.

When the body only uses fat for energy, molecules called ketones are formed. This state is called *ketosis*.

The ketogenic diet may help with:

- Seizures [\[R\]](#)
- Excess weight [\[R\]](#)
- Diabetes [\[R\]](#), [\[R\]](#)

How it helps

The keto diet, high in fat and low in carbs, forces your body to use fat for energy instead of glucose, reducing your body's production of insulin. Over the long run, this can help improve insulin sensitivity and potentially prevent insulin resistance.

136



Broccoli

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate at least one cup of chopped broccoli, either steamed or raw, into your daily diet. This can be as part of a meal or snack. Continue this practice daily for ongoing health benefits.

Description

Broccoli and broccoli sprouts are nutrient-dense vegetables packed with vitamins, minerals, and antioxidants. They are known for their potential to support a healthy immune system, protect against chronic diseases, and promote overall nutritional wellness.

Broccoli is high in vitamin K and C, as well as a number of other vitamins and minerals, and antioxidants like quercetin. A ½ cup serving provides 110 mcg of vitamin K or 92%DV.

How it helps

Broccoli contains sulforaphane, which might improve insulin sensitivity.

137



Dietary Magnesium

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Increase your intake of magnesium-rich foods such as leafy green vegetables, nuts, seeds, and whole grains. Aim to include these foods in your diet daily, following the recommended dietary allowance of 320 mg per day for women and 420 mg per day for men.

Description

Magnesium is a vital mineral involved in over 300 biochemical reactions in the body. It supports various functions, including muscle and nerve function, bone health, and blood sugar regulation.

[Magnesium](#) is an essential mineral. Your body needs it for [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Muscle, nerve, and bone function
- Blood sugar and blood pressure control
- DNA and protein production
- Strong immunity

Women need **310-320 mg** of magnesium per day, while men need **400-420 mg** [\[R\]](#).

Foods rich in magnesium include **nuts, seeds, and leafy greens**. Magnesium is also available as a supplement [\[R\]](#).

How it helps

Magnesium is involved in glucose metabolism, and higher intake is associated with improved insulin sensitivity.

138



Psyllium

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take 5 grams of psyllium husk powder with at least 8 ounces of water. Do this once daily, preferably in the morning before breakfast. Continue this regimen daily for ongoing digestive health benefits.

TYPICAL STARTING DOSE

5 g

Description

Psyllium is a plant-based dietary fiber derived from the seeds of the *Plantago ovata* plant. It is primarily used both traditionally and today, as a dietary supplement due to its high soluble fiber content, aiding in digestive health and regulating bowel movements. The main compounds in psyllium are soluble fiber and mucilage.

[Psyllium husk](#) might be beneficial for gut health and heart health. But what exactly is this supplement and how does it work?

Psyllium is an herb that grows around the world. Its “husk,” the outer coating of the psyllium seed, is full of fiber. The health benefits of psyllium husk are due to this fiber.

How it helps

Psyllium is a dietary fiber that slows digestion and helps control blood sugar levels, which can improve insulin resistance. In addition, it can promote weight loss by making you feel fuller, which is beneficial as weight loss can also improve insulin resistance.

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Aquatic Exercise

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Participate in aquatic exercise sessions, such as swimming or water aerobics, for 60 minutes, 3 to 5 times per week. Ensure the exercise intensity is moderate, allowing you to talk but not sing during the activity. Consistency over time is key, so aim to incorporate this into your weekly routine for at least 3 to 6 months to observe benefits.

TYPICAL STARTING DOSE

1 hour

Description

Aquatic exercise involves physical activity performed in water, such as swimming, water aerobics, or aquatic therapy. It is gentle on the joints, making it suitable for individuals with mobility issues, and can help improve cardiovascular fitness and muscle strength.

Aquatic exercise is any type of low-impact physical activity performed in a pool. In this type of cardio exercise, water helps the body float, which reduces gravity and makes the practice more comfortable and tolerable [\[R\]](#), [\[R\]](#).

Compared to land-based exercise, aquatic exercise may be better by [\[R\]](#):

- Reducing the stress and impact on joints
- Lowering fracture risk

Hence, it is usually **recommended for the elderly**. Aquatic exercise is also suitable for people who don't know how to swim [\[R\]](#).

How it helps

Exercising in water puts less strain on the joints and can increase insulin sensitivity through muscle contractions and glucose usage.

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Brown Seaweed

IMPACT

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EVIDENCE

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How to implement

Take a supplement containing brown seaweed extract, such as *Fucus vesiculosus* or *Ascophyllum nodosum*, in capsule or powder form. Aim for a daily dosage of 500-1000 mg, preferably with meals to enhance absorption. Continue this regimen for at least 8-12 weeks to evaluate its effects on your health.

TYPICAL STARTING DOSE

500 mg

Description

Brown seaweed, such as kelp and wakame, is a nutrient-dense marine alga often used in Asian cuisine and dietary supplements. It's a natural source of essential minerals like iodine and may offer various health benefits, including thyroid support and potential antioxidant effects.

How it helps

In a placebo-controlled trial of 65 patients with poor blood sugar control, supplementation with bladderwrack and brown seaweed extract for 6 months lowered fasting blood glucose, postprandial blood glucose, and HbA1c [\[R\]](#).

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Apple Cider Vinegar

IMPACT

0 / 5

EVIDENCE

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How to implement

Incorporate 1-2 tablespoons of apple cider vinegar into your diet daily by diluting it in a large glass of water. Consume this mixture before meals to potentially benefit from its effects.

Description

Apple cider vinegar is a fermented liquid made from crushed apples and is known for its potential health benefits. It is rich in acetic acid and may aid in weight management, improve digestion, and help regulate blood sugar levels, often used as a natural remedy for various conditions like acid reflux and insulin resistance.

[Vinegar](#) is often used in cooking to add sour flavor and to preserve foods through pickling. Some people also use vinegar for cleaning [\[R\]](#).

Apple cider vinegar is one of the most common vinegars produced from apples. As a health food, apple cider vinegar may help [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Reduce blood sugar
- Lower cholesterol
- Fight infections

How it helps

Apple cider vinegar helps manage insulin resistance by improving your body's sensitivity to insulin, facilitating more effective glucose intake by cells. This results in lower blood sugar levels, reducing the risk of conditions like diabetes.

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Bitter Melon Supplement

IMPACT

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EVIDENCE

0 / 5

How to implement

Take a bitter melon supplement in the form of capsules or tablets, typically ranging from 500 mg to 1000 mg per day, split into two to three doses before meals. It's recommended to follow the dosage instructions on the product label or consult a healthcare provider for personalized advice. Continue for as long as recommended by the healthcare provider, usually a few weeks to months, to monitor effectiveness and tolerance.

TYPICAL STARTING DOSE

500 mg

Description

Bitter melon supplements are often used in traditional medicine for their potential to support blood sugar control. They contain compounds that may help regulate glucose metabolism and promote overall metabolic health.

How it helps

Bitter melon contains compounds that may reduce blood glucose by improving the activity of insulin.

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Extra Virgin Olive Oil (EVOO)

IMPACT

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EVIDENCE

0 / 5

How to implement

Incorporate 1-2 tablespoons of extra virgin olive oil into your daily diet. Use it as a dressing for salads, vegetables, or incorporate it into cooking, but avoid using it at high temperatures to preserve its health benefits.

Description

Extra virgin olive oil is a high-quality olive oil obtained from the first pressing of olives. It is rich in monounsaturated fats and antioxidants, like polyphenols, and is associated with various health benefits, including heart health and anti-inflammatory properties.

[Olive oil](#) is fat from the olive, a traditional tree of the Mediterranean Basin [\[R\]](#).

Olive oil has anti-inflammatory and antioxidant properties. It may also reduce the risk of [\[R\]](#), [\[R\]](#):

- Heart disease
- Diabetes
- Cancer

Olive oil is also the primary fat source in the [Mediterranean diet](#), which may improve brain and heart health [\[R\]](#).

How it helps

Eating a diet rich in olive oil may increase insulin sensitivity more in people with certain gene variants [\[R\]](#).

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Limit Calorie Intake

IMPACT

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EVIDENCE

0 / 5

How to implement

Consume fewer calories than your body needs for maintenance. Calculate your daily caloric needs using an online calculator based on your sex, age, weight, height, and activity level, then reduce that number by 500-1000 calories per day to safely lose 1-2 pounds per week. Adjust the caloric intake as needed based on your progress.

Description

People often limit their calorie intake to help them lose weight [\[R\]](#), [\[R\]](#). However, moderate calorie restriction may also help you stay healthier and age better [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

There are different ways to take in fewer calories. You can:

- **Eat low-calorie foods**, such as those rich in proteins, fiber, and water. Avoid fatty and sugary foods, which tend to be high in calories [\[R\]](#).
- Try [intermittent fasting](#), which involves changing how often you eat [\[R\]](#).

If you are restricting your calories, make sure your diet remains healthy and balanced. Experts also recommend being physically active, to prevent the loss of muscle and bone mass.

How it helps

Restricting calorie intake can lead to weight loss, which often improves insulin sensitivity.

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Milk Thistle (Silymarin)

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take a 300 mg milk thistle (silymarin) supplement daily with water, preferably with a meal for better absorption. Continue this regimen as advised by your healthcare provider.

TYPICAL STARTING DOSE

300 mg

Description

Silymarin is a natural plant extract derived from the milk thistle plant (*Silybum marianum*). It has been traditionally used for its potential anti-inflammatory and liver-protective properties. Silymarin consists of several flavonolignans, including silybin, silydianin, and silychristin.

Milk thistle (*Silybum marianum*) is a purple flowering plant in the daisy family. Traditionally, it has been used for liver problems. Some people also eat the leaves in salads [\[R\]](#), [\[R\]](#).

The extract of milk thistle is called *silymarin* [\[R\]](#), [\[R\]](#), [\[R\]](#).

People use milk thistle to help with [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Liver problems
- Blood sugar control
- Indigestion
- Skin problems

How it helps

Milk Thistle, or Silymarin, has anti-inflammatory and antioxidant properties which may improve liver function and aid in reducing insulin resistance. It assists in controlling blood sugar levels and may boost insulin sensitivity, improving the body's response to insulin.

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Caper Fruit Extract

IMPACT

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EVIDENCE

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How to implement

Take 400-600 mg of caper fruit extract daily, in capsule form, preferably with meals to aid absorption. Continue this supplementation daily for at least 8-12 weeks to assess benefits.

TYPICAL STARTING DOSE

400 mg

Description

Caper fruit extract is sometimes used for its potential antioxidant properties and mild diuretic effects. It may have benefits for overall health, but research is ongoing.

How it helps

Caper Fruit Extract has been shown to increase insulin sensitivity, helping the body respond better to insulin and using glucose more effectively. This can help regulate blood sugar levels and manage insulin resistance.

Next Steps

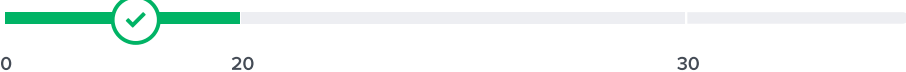
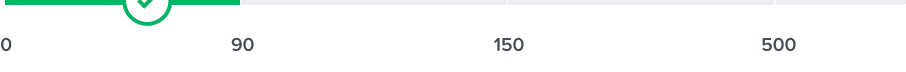
Remember, your genes only tell one important part of your health story!

Now that you've seen your DNA-based results for this health topic, let's take a look at other contributing factors.

Your lab results

Your lab results are impacted by the combined effect of your genes, environment and lifestyle.

Lab tests will give you the best picture of your current health status, while your genes provide insight into your health predispositions and which recommendations are best for you.

	VLDL Cholesterol	11 mg/dL		9 Nov 2025
	HbA1c	30 mmol/mol		29 Dec 2025
	Zinc	17.12 umol/L		9 Nov 2025
	Glucose, Fasting	97 mg/dL		9 Nov 2025
	Vitamin D, 25-Hydroxy, Total	58.59 ng/mL		9 Nov 2025
	Triglycerides	54 mg/dL		9 Nov 2025
	HDL Cholesterol	42 mg/dL		9 Nov 2025
	Homocysteine	12.84 umol/L		9 Nov 2025
	Insulin, Fasting	9.08 uU/mL		9 Nov 2025

