THE INSTITUTE FOR FUNCTIONAL MEDICINE®

Micronutrients for Insulin Sensitivity

Insulin is the primary hormone that controls blood sugar levels in the body. Insulin resistance is a condition where muscles and other tissues do not respond to insulin as expected. Insulin resistance causes the body to make more and more insulin to keep blood sugar in a healthy range. Over time, the body's ability to produce higher amounts of insulin is exhausted, which can lead to the development of prediabetes and eventually type 2 diabetes.

STRATEGIES TO SUPPORT INSULIN SENSITIVITY

- Vitamin D
- Magnesium
- Zinc
- Alpha-lipoic acid
- Probiotics
- Chromium
- CoQ10
- Physical activity
- Sleep
- Stress management

Several things can increase the responsiveness of muscles and tissues to insulin, including regular cardio and resistance exercise, stress management, good sleep, maintaining a healthy weight, and nutrition. Summarized here are several nutritional factors that support insulin sensitivity, especially when combined with an overall healthy diet and lifestyle.

Vitamin D

Vitamin D is a fat-soluble vitamin that also acts like a hormone in the body. There are vitamin D receptors on many cells throughout the body, including insulin-secreting pancreatic beta cells. Studies show that lower vitamin D levels are associated with insulin resistance.[1] People with low blood levels of the nutrient should supplement with vitamin D (preferably the D3 form) and monitor their blood levels to adjust supplement dosages accordingly.

Common vitamin D sources: sunlight exposure, wild salmon, sardines, organic whole milk (fortified), and egg yolks

Magnesium

Magnesium is an essential mineral that supports bone health, blood pressure, and insulin function. It also participates in hundreds of metabolic reactions. People who don't get enough magnesium are at higher risk for type 2 diabetes, heart disease, metabolic syndrome, and osteoporosis.[2]

Some individuals may have a higher functional need for magnesium, which requires supplementation.[2] Supplemental magnesium comes in several forms, some of which have a laxative effect. Talk to your functional medicine provider to determine which magnesium supplement is best for you.

Common magnesium sources: nuts, avocado, garbanzo beans, leafy greens, and whole grains

Tip: Physical activity, sleep, and stress management are powerful natural insulin sensitizers. Taking a supplement without addressing these lifestyle factors is unlikely to address insulin resistance long term.

Zinc

Zinc is an essential mineral involved in growth and development, immune system function, vision, fertility, and antioxidant production. Zinc is also essential for normal insulin function. Low levels of zinc are associated with impaired insulin secretion and decreased insulin sensitivity.[3] In multiple studies, zinc supplementation has been shown to improve insulin resistance.[3] Supplementing with zinc may lead to deficiencies in other minerals. Work with your healthcare practitioner to determine the right dose and duration for you.

Common zinc sources: oysters, grass-fed beef, organic soybeans, yogurt, nuts, legumes, and cheese

Alpha-Lipoic Acid

Alpha-lipoic acid, also called lipoic acid, is a substance made in the body and found naturally in many fruits and vegetables. It is involved in cellular energy production and is an antioxidant that protects nerves and other tissues. Some research shows that alpha-lipoic acid supports a healthy weight, which in turn helps insulin sensitivity.[4] Multiple studies have shown that alpha-lipoic acid also reduces symptoms of diabetic nerve pain.[5]

Common alpha-lipoic acid sources: spinach, broccoli, peas, Brussels sprouts, tomatoes, and grass-fed organ meats

Probiotics

Probiotics are beneficial microbes that have a positive effect on your gut microbiome. The gut microbiome is the collection of bacteria, yeasts, and viruses that live in your digestive tract. Although probiotics do not colonize the gut, they provide benefits as they pass through your digestive system.

Probiotics are associated with improvement in digestive symptoms, like gas and bloating. Emerging research shows probiotics may also have beneficial effects on reducing blood sugar, insulin, and hemoglobin A1c (average blood sugar), especially for those who have type 2 or gestational diabetes.[6]

Common probiotic sources: yogurt, kefir, fermented foods (e.g., kimchi, sauerkraut, miso, etc.), and probiotic supplements

Chromium

Chromium is a trace mineral required in very small amounts. It is thought to play a role in insulin function, but its exact mechanism is unclear. Studies looking at the effect of chromium supplementation on insulin resistance and blood sugar control are inconsistent, with a smaller number of studies showing positive benefits, mainly in those who have diabetes.[7] Other studies suggest that chromium and biotin (vitamin B7) combined may help lower hemoglobin A1c and cholesterol.[8] Those at risk for kidney disease should not take chromium supplements.

Common chromium sources: broccoli, organic turkey breast, green beans, grapes, oranges, apples, and bananas

CoQ10

Co-enzyme Q10 (CoQ10) is a fat-soluble substance made by the body and found in food. CoQ10 is involved in cellular energy production. A form of CoQ10 called ubiquinol also acts as an antioxidant in the body. CoQ10 has been shown to increase insulin sensitivity in individuals without diabetes and may modestly lower blood sugar in those with type 2 diabetes.[9,10]

The body's production of CoQ10 decreases with age. Certain medications, like statins, have been shown to deplete CoQ10 in the body.

Common CoQ10 sources: grass-fed beef, organic chicken, fish, sesame seeds, pistachios, and broccoli

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