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Micronutrients for Insulin Sensitivity

Insulin is the main hormone that regulates blood sugar in the body. Insulin resistance is a condition in which cells don't respond normally to insulin,[1,2] and it is associated with many chronic health problems.[3–6] This guide shows you micronutrients – vitamins and minerals – that positively affect your body's insulin response so you can support healthy blood sugar control.

The Spectrum of Insulin Resistance and Insulin Sensitivity

Insulin resistance occurs when cells, mainly in the liver, muscles, body fat, and brain, don't respond normally to insulin.[1,2] Insulin resistance causes the body to make more and more insulin to keep blood sugar in a healthy range.[1] Over time, the body's ability to produce insulin decreases, which can lead to the development of metabolic syndrome,[3] prediabetes[4] and type 2 diabetes.[4] Insulin resistance is also associated with high blood pressure,[5] cardiovascular disease,[6] fat buildup in the liver,[7,8] obesity,[9] and polyendocrine metabolic ovarian syndrome (PMOS).[10]

Insulin sensitivity is the opposite of insulin resistance. It refers to how sensitive your body's cells are to insulin.[11] Improving insulin sensitivity is linked to reduced insulin resistance.[11] A variety of diet and lifestyle factors are associated with improved insulin sensitivity,[12–14] including micronutrients (vitamins and minerals).[15]

Nutrients Associated with Insulin Sensitivity

Your body needs a variety of micronutrients to support insulin sensitivity.[15] The following micronutrients are associated with insulin sensitivity.

Chromium

Chromium is a trace mineral required in the diet in small amounts. Low chromium levels are associated with type 2 diabetes,[16,17] and chromium supplementation is associated with improved insulin sensitivity in women with PMOS.[18,19] Chromium may support insulin sensitivity by improving how cellular insulin receptors respond to insulin.[20]

Examples of dietary sources of chromium (from highest to lowest):[21] beef, lettuce, turkey, green beans, bananas, whole wheat bread, tomatoes, peanut butter

Micronutrient Supplements

Micronutrient supplements may be helpful for some people with insulin resistance.[15] For example, the nutritional supplement alpha-lipoic acid (ALA) is associated with improved insulin sensitivity in women with PMOS,[47] while the antioxidant nutrient coenzyme Q10 is linked to improved blood sugar control in people with diabetes and other metabolic health issues.[48]

However, it is possible to overconsume certain nutrients, such as vitamin D, through supplementation.[49] Talk with your healthcare provider to determine whether micronutrient supplementation is appropriate for you.

Magnesium

Magnesium is an essential mineral that supports over 600 enzymes,[22] which affect processes ranging from energy production to vitamin D activity. Low magnesium intake is linked to type 2 diabetes.[23,24] Increasing magnesium intake is associated with improvements in insulin sensitivity,[25] possibly by helping insulin bind to its receptor on cells and lowering inflammation.[25]

Examples of dietary sources of magnesium (from highest to lowest):[26,27] pumpkin seeds, amaranth, Brazil nuts, almonds, spinach, Swiss chard, cashews, peanuts, black beans, edamame, avocado, brown rice

Selenium

Selenium is a trace mineral that supports antioxidant activity and thyroid function.[28] A healthy selenium intake is associated with improved insulin sensitivity in people with diabetes,[29] cardiovascular disease,[29] and gestational diabetes.[30] Selenium may support insulin sensitivity by regulating oxidative stress,[30] an imbalance between reactive molecules and antioxidants in the body that is linked to insulin resistance.[31]

Examples of dietary sources of selenium (from highest to lowest):[32,33] Brazil nuts, yellowfin tuna, oysters, clams, halibut, sardines, shrimp, salmon, cod, beef, cottage cheese, sunflower seeds, eggs, oatmeal

Vitamin D

Vitamin D is a vitamin that also acts like a hormone in the body.[34] There are vitamin D receptors on many cells in the body, including cells in the pancreas that release insulin.[34] Low vitamin D levels are associated with insulin resistance.[35]

Lifestyle source of vitamin D: Throughout human history, skin exposure to sunlight was the main source of vitamin D. Our increasingly indoor lifestyles in many parts of the world have changed this.[36,37] The amount of vitamin D that can be made through sun exposure also varies with skin pigmentation, the amount of skin exposed to the sun, age, where you live, and the season.[37,38] Vitamin D is found in small amounts in some foods.[39,40]

Some people may need a vitamin D supplement to maintain healthy vitamin D levels. Work with your healthcare provider to determine whether vitamin D supplementation is appropriate.

Examples of dietary sources of vitamin D (from highest to lowest):[40] sockeye salmon, canned mackerel, sardines, tuna, beef liver, whole egg (with yolk), and foods fortified with vitamin D.

Zinc

Zinc is a mineral involved in growth and development, immune system function, and reproductive health.[41] It is also essential for insulin function.[42] A low zinc level is associated with insulin resistance in women with gestational diabetes[43] and high fasting blood glucose.[44] Zinc supplementation is associated with improved insulin sensitivity.[45]

Examples of dietary sources of zinc (from highest to lowest):[46] oysters, game meat, beef chuck roast, crab, ground beef, dark meat chicken, cheddar cheese, Swiss cheese, pumpkin seeds, cashews, sunflower seeds

Partner with a Nutrition Professional

Consider working with a qualified nutrition professional to optimize your nutrition for healthy insulin sensitivity. A nutrition professional can help you personalize your diet to optimize insulin sensitivity and provide tailored recommendations to meet your micronutrient needs.

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