



CONSIDERATIONS FOR ADDRESSING INSULIN RESISTANCE & METABOLIC SYNDROME

Normally, food is absorbed into the bloodstream in the form of sugars such as glucose. The rise in blood sugar signals the pancreas to increase the secretion of a hormone called insulin. This hormone attaches to cells, removing sugar from the bloodstream so that it can be used for energy in the cells.

Insulin resistance occurs when a normal amount of insulin is NOT ABLE to open the cell "door". In response the body secretes even more insulin in an attempt to maintain normal blood glucose levels (hyperinsulinemia).

Alternatively, insulin resistance occurs when there are too few insulin receptors...the glucose bounces off the cell wall instead of passing into the cell.

Metabolic syndrome is defined as having three or more of six metabolic risk factors:

- Insulin resistance (elevated fasting insulin), which predisposes individuals to pre-diabetes or type 2 diabetes
- Hypertension (BP > 130/85)
- Abdominal obesity (Men > 40 inches; Women > 35 inches)
- Prothombic state (elevated fibrinogen or plasminogen activator inhibitor-1)
- Proinflammatory (elevated CRP)
- High serum lipids, specifically Triglycerides, LDL, and reduced HDL

Considerations for Insulin Resistance

First line treatments of insulin resistance include lifestyle modifications with weight loss as the goal.

- Studies have shown that exercise (with a goal of at least 150 min/week) resulting in weight loss reduced the risk of type 2 diabetes. The same studies found lifestyle changes to be superior to Metformin.
- Another study following 1,079 patients with impaired glucose tolerance in a diabetes prevention program showed that for every kilogram of weight loss (1 kg = 2.2 pounds), there was a 16% reduction in risk of developing Type II diabetes.
- Among overweight individuals with type II diabetes, a 2011 study showed that weight loss of 5 to 10% correlated with improved HgA1C, blood pressure, triglycerides and HDL, and weight loss of 10 to 15% correlated with even greater improvements.

- Dietary modifications are paramount. Increasing fiber and watching the glycemic index of foods is essential in managing blood sugar levels. (more dietary details below).
- Decreasing stress, thereby lessening strain on the adrenal glands, will result in better overall health and contribute to keeping the body's insulin levels in check.
- Smoking is associated with higher abdominal adiposity, metabolic syndrome, insulin resistance and a higher risk of type 2 diabetes; while smoking cessation decreases the risk of type 2 diabetes to normal within a few years.
- Moderating alcohol intake, and proper sleeping habits, will help to alleviate blood chemistry surges, which in turn will promote a thriving, well-balanced body.

Supplements

- Vitamin D – 1000-2000 IU qd
- Cinnamon – ½ tsp qd
- Fish Oil – 2-3 g qd
- CoQ-10 – 60-100 mg qd
- Chromium – 200-600 mcg qd
- Biotin – 5000 mcg qd
- Magnesium Citrate – 1000 mg qd
- Alpha Lipoic Acid – 300 mg qd

Herbs

- Fenugreek – 750 mg; 2 bid
- Guar Gum – 2.5 g qd
- Milk Thistle – 200-400 mg qd
- Gymnema – 400 mg tid
- Bitter Melon – 250 mg bid
- Berberine - 500mg bid to tid with meals
- Apple pectin, beet powder and oat fiber

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Considerations for Metabolic Syndrome

Because patients with metabolic syndrome are at an increased risk of developing cardiovascular disease, therapeutics should aim at decreasing this risk. The primary target should be to modify the cardiac risk factors such patients have. The first step should be lifestyle modification including diet, exercise, and weight loss. Such lifestyle modifications help with insulin resistance, blood pressure, and lipid abnormalities.

Supplements

- Niacin – 2 g qd (Must titrate up slowly to reduce flushing effects)
- Nattokinase – 2000-4000 IU qd
- Lecithin – 1-2 tbs qd
- Vitamin E – 800 IU qd
- Phosphatidyl choline – up to 3 g qd
- Fish Oil – 2-3 g qd
- CoQ-10 – 60 mg qd
- Magnesium – up to 1000 mg qd
- Bromelain – 500-1000 mg qd
- Quercetin – 500 mg qd
- Green Tea – daily
- Ginger/Curcumin/Oregano — frequent consumption
- Garlic/ Onions – frequent consumption
- Holy Basil - 5ml extract bid or 500 to 1000 mg powdered leaves bid

Dietary Advice for IR and Metabolic Syndrome

- 30% protein with high fiber and avoidance of starchy, sugary carbs
- Abundant greens, fresh veggies....
- Avoid refined processed foods, sugars and processed carbs like pasta and breads
- Avoid artificial sweeteners and sugars
- Encourage nuts, legumes and lentils

Mechanisms of Action

Alpha Lipoic Acid: ALA stimulates insulin activity, can make patients more insulin sensitive, and can safely lower and stabilize glucose levels.

Apple pectin, beet powder and oat fiber: Slows the absorption of glucose into the blood stream (which also lowers insulin).

Berberine: Has been shown to lower blood sugar and increase insulin receptor expression.

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Biotin: Involved in the metabolism of carbohydrates, proteins, and fats. Biotin is required to metabolize carbohydrates and control blood sugar levels through its effects on liver glucose/glycogen metabolism. This nutrient also acts like chromium to reduce elevated blood sugar levels.

Bitter Melon: Suppresses blood glucose spike in response to sweets.

Bromelain: May lower plasma fibrinogen levels and increase serum fibrinolytic activity which can reverse the coagulation that occurs in inflammation.

Chromium: Chromium's function in our bodies is critical; it works with insulin to move glucose into cells.

Cinnamon: Has been shown to reduce blood sugar levels and increase natural production of insulin. May lower blood cholesterol as well.

CoQ-10: The antioxidant properties of CoQ10 can be effective for ameliorating cardiovascular risk in insulin resistance and metabolic syndrome.

Fenugreek: Reduces blood sugar and insulin resistance following meals, and lowers cholesterol (LDL, TG and total cholesterol).

Fish Oil: There are conflicting opinions about whether fish oil can directly reduce insulin resistance. However, one study of 12 overweight men and women with insulin resistance showed a decrease in IR after taking DHA (a component of fish oil) for 12 weeks. Fish oil will aid in the management of inflammation, heart disease, hypertension, and high triglycerides, all issues associated with insulin resistance and metabolic syndrome.

Garlic/Onions: Garlic mimics the effects of insulin on the cell receptor. Onions contain flavinoids like quercetin.

Ginger/ Curcumin/Oregano: All are powerful antioxidants. Ginger has been shown to increase the body's sensitivity to insulin, and oregano has anti-hyperglycemic effects.

Green Tea: Has been shown to improve lipid and glucose metabolisms, enhance insulin sensitivity, and balance the metabolic rate of fat deposition and fat burning. Also an antioxidant.

Guar Gum: Lowers cholesterol, TG and blood pressure. Helps regulate appetite.

Gymnema Sylvestre: Lowers glucose, improves insulin sensitivity, and is regenerative to beta cells in the pancreas.

Holy Basil: Improves lipid profile and blood pressure, decreases blood sugar and enhances insulin secretion.

Lecithin: Lecithin supplementation decreases hyperlipidemia and influences lipid metabolism.



Magnesium: Magnesium deficiency has been associated with the development of insulin resistance and Type II diabetes, whereas magnesium supplementation has been shown to improve insulin sensitivity.

Milk Thistle: May lower fasting glucose and fasting insulin levels.

Nattokinase: Breaks down fibrin protein deposits and prevents the formation of clots and improves blood viscosity.

Niacin: Niacin is a good option for treating the triad of lipid abnormalities seen in metabolic syndrome because it raises HDL, lowers triglycerides, and increases LDL particle size.

Phosphatidylcholine (PC): the predominant component in cellular membranes. PC positively influences various conditions related to the development and progression of atherosclerosis, such as lipoprotein alterations and free radical-induced lipid peroxidation. Other results include improved cholesterol, triglyceride, and LDL-to-HDL cholesterol ratios, and a reduction in atherosclerotic plaque formation. Excessive blood clotting is also reduced, and blood flow properties and microcirculation are improved.

Quercetin: Can improve dyslipidemia, hypertension, and hyperinsulinemia in patients with metabolic syndrome. May also have anti-inflammatory effects.

Vitamin D: Research shows that a higher Vitamin D status has been correlated with 60% improvement in insulin sensitivity. (Clinical trial using 1332 IU/ day vit D for 30 days in 10 women with Type II diabetes improved 21%). Alternatively, Metformin was shown to give a mere 13% improvement in insulin sensitivity.

Vitamin E: The March 15, 2008 issue of Free Radical Biology and Medicine published the results of a study which states that supplementing with alpha and gamma-tocopherol reduces oxidative stress and inflammation in men and women with metabolic syndrome.

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