

Metabolic Syndrome and Functional Foods

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The metabolic syndrome, aka "Syndrome X," has received increased attention in the past few years. According to the American Heart Association and the National Heart, Lung, and Blood Institute's *Scientific Statement*, metabolic syndrome consists of multiple, interrelated risk factors of metabolic origin that appear to directly promote the development of atherosclerotic cardiovascular disease (ASCVD). These interrelated risk factors include:

- abdominal obesity
- atherogenic dyslipidemia
- elevated blood pressure
- insulin resistance or glucose intolerance
- prothrombotic state
- proinflammatory state¹

It is estimated that metabolic syndrome affects 50 million or one in six Americans! Syndrome X dramatically increases the risk of coronary heart disease, stroke and peripheral vascular diseases such as dementia, intermittent claudication, erectile dysfunction and type 2 diabetes.

Risk Factors

The major risk factors are physical inactivity, overweight, diabetes, and insulin resistance. Data released by the Centers for Disease Control and Prevention show that more than 59 percent of American adults do not engage in vigorous leisure-time physical activity lasting at least 10 minutes on most days. Approximately 70 percent of the U.S. public can be classified as being sedentary!

The dominant underlying risk factors for this syndrome appear to be abdominal obesity and insulin resistance. Insulin resistance is a generalized metabolic disorder, in which the body can't use insulin efficiently. Indeed, metabolic syndrome also is called insulin resistance syndrome.

About 65 percent of Americans age 20 and older are overweight or obese. Central abdominal obesity (apple shape) is an even greater risk factor. Central obesity is defined as a waist size > 90 percent of hip size (Europe) and > 40 inches in males or > 38 inches in females (U.S.). Indeed, most people with insulin resistance have abdominal obesity. Hard, deep abdominal fat (a "beer belly") is the greatest risk factor.

Genetic, Acquired and Iatrogenic Factors

Some people are genetically predisposed to insulin resistance. Acquired factors such as age, hormonal imbalance, excesses of body fat and limited physical activity can more easily elicit insulin resistance and the metabolic syndrome in these people. Metabolic syndrome is increasingly being recognized as a side effect of several commonly used drugs.²

Differential Diagnosis

Hyperandrogenemia has been associated with insulin resistance in women with polycystic ovary disease. Furthermore, even mild hypercorticism has been implicated in the development of

abdominal obesity.

Medical Management

The AHA states that the primary goal of clinical management of the metabolic syndrome is to reduce the risk for cardiovascular disease and type 2 diabetes, which may include medications to control blood pressure, blood lipids (LDL) and blood sugar, increase insulin sensitivity and lessen inflammation and blood coagulation.

Long-term management lifestyle therapies are the first-line interventions to reduce metabolic risk factors. These lifestyle interventions include:

- immediate cessation of smoking;
- weight loss to achieve a desirable weight (BMI less than 25 kg/m²);
- increased physical activity, with a goal of at least 30 minutes of moderate-intensity activity on most days of the week; and
- healthier food habits that include reduced intake of saturated fat, trans fats and cholesterol.

Dietary Recommendations

The most effective and healthful dietary recommendations for long-term weight loss are reduced-calorie diets, consisting of a modest 500- to 1,000-calorie/day reduction. A realistic goal for weight reduction is to reduce body weight by 7 percent to 10 percent over a period of six to 12 months.

Long-term maintenance of weight loss is best achieved when regular exercise is included in the weight reduction regimen. The emphasis on behavioral change should include improvements in eating habits such as setting goals, planning meals, reading labels, self-monitoring, and avoiding eating binges by eating small, regular, low-glycemic-load meals - starting with breakfast.

Adult Treatment Plan III recommendations for diet composition for patients with metabolic syndrome are consistent with general dietary recommendations, namely:

- low intake of saturated fats, trans fats and cholesterol;
- higher intake of unsaturated fats;
- reduced consumption of simple sugars; and
- increased intakes of fruits, vegetables (legumes) and wholegrains.³

Killer Fats

Scientific evidence shows that consumption of trans fats, saturated fat and dietary cholesterol raises low-density lipoprotein (LDL), aka "bad" cholesterol levels, which increases the risk of CHD.⁴

Lean Proteins

"Replacing carbohydrates with protein may be associated with a lower risk of ischemic heart disease."⁷ Lean proteins are proteins that contain minimal amounts of "bad" fats. It is generally recommended that less meat should be consumed and more proteins from whey, soy and rice enjoyed. Interestingly, whey and soy have both been shown to affect favorably cholesterol levels, and whey has been shown to lessen appetite.

Good Fats

Omega-6 and omega-3 fatty acids, aka linoleic acid (LA) and alpha-linolenic acid (ALA), are "essential" because they cannot be synthesized by the human body and must be obtained from the

diet. Fatty acids serve functionally as substrates for the synthesis of hormone-like signaling molecules collectively called eicosanoids. These consist of prostacyclins, prostaglandins, thromboxanes and leukotrienes. Investigations all over the world have shown the potentially beneficial effects of omega-3 fatty acids in inflammatory diseases by reducing blood pressure (dilating blood vessels) and blood coagulation, and lowering insulin resistance.

The typical Western diet is far too high in omega-6 fats from vegetable oils and relatively extremely deficient in omega-3 fats. Persons wanting to get the most omega-3 influence are advised to consume some sources of EPA or DHA from fish or fish oil supplements in addition to ALA.⁸⁻¹⁰

Complex Carbohydrates

Carbohydrate classes include digestible monosaccharides, disaccharides, oligosaccharides, simple starches, resistant starches, and indigestible fiber. The current recommendation for adults is 20-35 grams of dietary fiber per day. The average American eats 14-15 grams of dietary fiber a day, at best.

"Net carbs" refers only to digestible carbohydrates. Generally speaking, the more complex the carbohydrate, the lower its glycemic index. The glycemic index measures how fast and how far blood sugar rises after you eat a food that contains carbohydrates.¹⁵

Fruits and Vegetables

The epidemiologic evidence strongly supports the inverse association between the intake of fruits and vegetables and ASCVD and blood pressure. Unfortunately, fewer than 25 percent of Americans eat five or more daily servings of these two food groups combined. Thus, patients with metabolic syndrome need to make extra sure that they eat at least five servings of fruits and vegetables every day.¹²

Nutraceuticals

Evaluations of the insulin-potentiating activity of aqueous extracts of several herbs, spices, and medicinal plants have been conducted, and have found that cinnamon polyphenols are the most active.¹³

Phytochemicals?

New research presented at the recent Annual Scientific Meeting of the American Society of Hypertension provides evidence that a natural tomato extract may help lower blood pressure in hypertensive patients. Polyphenol phytochemicals found in berries, teas, and soybeans appear to inhibit inflammation and platelet aggregation, and block the angiotensin-converting enzyme (ACE) responsible for raising blood pressure. Catechins in green tea and isoflavones in soy also inhibit platelet aggregation¹⁴

Compliance Hurdles

Only 3 percent of people consume the recommended amounts of at least four of the five USDA-recommended food groups. Products such as Ensure, SlimFast, and Balance Bars are commercial attempts at providing convenient forms of instant meals that help control blood sugar and support weight loss in our "always on the go" society.

The *ADA Position Paper on Functional Foods 1995* states, "The development of 'functional foods' has evolved as food and nutrition science has advanced beyond the treatment of primary deficiency syndromes. Functional foods are usually understood to be any potentially healthful food or food ingredient that may provide a health benefit beyond the traditional nutrients it contains."

Functional Foods for Metabolic Syndrome

Based on the above brief review, it may be proposed that the ideal functional food for metabolic syndrome would be:

- high in lean protein, fiber and omega-3 fats;
- low-glycemic, while providing carbohydrates;
- low or free of saturated fats, trans fats or omega-6 fats;
- fortified with vitamins and minerals;
- rich in phytonutrients-zoonutrients; and
- easy to mix and tasty!

Truly professional-quality functional foods are becoming more and more available. These consist of bars, meal replacements, and phytonutrient drink mixes. Stevia, a natural noncaloric sweetener, has the advantage of nonglycemic sweetness while suppressing appetite, thus enhancing compliance. The availability of good-tasting, highly convenient functional foods that contain the above ingredients is vital to supporting compliance to dietary guidelines which are otherwise often very difficult to maintain. To get significant amounts of EPA/DHA, separate supplementation often is still needed.

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