



The Metabolic Syndrome

This answer is brought to you by many of the Australian nutrition professionals who regularly contribute to the Nutritionists Network ('Nut-Net'), a nutrition email discussion group.

The following questions and answers address a medical condition known as the 'metabolic syndrome', and also as 'syndrome X'. Although these names are synonymous and both are widely used, for the sake of consistency only the term 'metabolic syndrome' will be used in this FAQ.

What does 'metabolic syndrome' mean?

Metabolic syndrome is a condition in which a group of risk factors for cardiovascular disease (heart disease and stroke) and type 2 diabetes occur together. Although it doesn't have a universally accepted definition, most health professionals would include the following as the principal components:

Abdominal obesity (i.e. excess body fat in the region of the stomach); High blood pressure (also known as 'hypertension'); Low blood levels of the 'good' cholesterol, HDL; High blood levels of the 'bad' cholesterol, LDL; High blood levels of triglycerides; and Insulin resistance (that is, an impaired ability of the body's insulin to handle blood glucose).

The levels of each of these components that have been used as criteria for diagnosing metabolic syndrome are shown in [Appendix A](#).

People with three or more of the above symptoms can be considered to have the metabolic syndrome, greatly increasing their risk of cardiovascular disease and/or type 2 diabetes, two of the most pervasive diseases in Western populations.

How common is the metabolic syndrome?

Although its exact frequency isn't known, the condition is widespread among the adult population in developed nations, and increases in frequency with age. For example, a study in the United States found that about 7% of adults aged 20-29 years had metabolic syndrome, while 43% of those in the age group 60-69 were affected. So nearly half of the adults aged 60-69 had the syndrome. But this study was based on results obtained in the period 1988-1994, when the rate of obesity was much less than now. The rate of metabolic syndrome among American (and also Australian) adults is almost certainly greater now than it was at the time of that study. It is also starting to appear in affluent adults who have adopted Western diets and lifestyles in developing nations.

However, it isn't just adults who are affected - the condition is also afflicting an increasing number of children and adolescents as the worldwide epidemic of obesity spreads across the age groups. For example, a recent US study found that 20-25% of obese children and adolescents also exhibited insulin resistance, a key element of metabolic syndrome and the condition that can lead to type 2 diabetes.

What are the health implications of having metabolic syndrome?

Each of the components of metabolic syndrome acts to significantly increase the risk of developing one or more diseases. As examples, excess abdominal fat is associated with increased risk of type 2 diabetes and heart disease; hypertension is the most important risk factor for stroke; high blood LDL and low HDL increase the risk of heart disease; and insulin resistance can be the first step on the road to type 2 diabetes. In brief, having type 2 diabetes significantly increases the risk of developing heart disease, kidney disease and blindness, and also of having to undergo limb amputations (due to gangrene).

The rapid increase in incidence of metabolic syndrome, not only among adults but also in children and adolescents, represents a potential 'time bomb' for the future adult populations of developed nations. Effective preventive measures are needed for the entire population, and ways of reducing the incidence of metabolic syndrome among adults (mainly) are also urgently needed.

What can be done to reduce my risk of developing metabolic syndrome, or to help overcome the syndrome if I already have it?

First and foremost, if you are undergoing treatment for any of the components of metabolic syndrome (or for the actual diseases associated with it, such as diabetes or heart disease) it is essential that you take the advice of your professional health carer(s). Your doctor and/or dietitian know your particular circumstances and can prescribe treatment that is tailored to best meet your requirements. The advice provided in the remainder of this FAQ is of a general nature only.

Although the incidence of metabolic syndrome is increasing, the situation is far from hopeless. Metabolic syndrome is a reasonably recent phenomenon and its causes, although not entirely understood, include environmental factors. This means that something has changed in the environment to promote obesity, hypertension, insulin resistance and so on. Examples of environmental changes that may have contributed to the metabolic syndrome include a marked reduction (by most people) in physical activity, and an increase in the number of meals eaten away from home (particularly foods that are rich in saturated fat and salt). Clearly, if the environment can be changed in one direction, those changes are reversible and the metabolic syndrome can be overcome.

Steps you can take to reduce the risk (or severity) of metabolic syndrome include:

(i) Increase activity level

The 'diabetes epidemic' that is sweeping the Western world, and is increasingly affecting affluent groups in developing nations, parallels the obesity epidemic that began a decade or so earlier. Although being obese is the single most important risk factor for type 2 diabetes, it is also true that being normal weight is not a guarantee of protection against diabetes. Some slim people also develop insulin resistance, and a small proportion of these will progress to diabetes. Physical activity can assist in reducing the risk (or severity) of metabolic syndrome independently of any effects of body weight.

This also means that, even if you are having trouble losing weight, increasing physical activity will help to reduce your risk of developing heart disease or type 2 diabetes. This is the cornerstone of the 'health at any size' movement.

You don't have to be extremely (or even very) active to gain substantial benefit. By taking part in just 30 minutes of moderately-vigorous activity (such as brisk walking, cycling,

swimming, light weight-training and so on) daily, you can substantially reduce the risk (or severity) of metabolic syndrome.

(ii) Improve health through better eating habits

In brief, the diet to counter metabolic syndrome should be based on the Dietary Guidelines for Australians (see [Appendix C](#) for details of the most relevant guidelines).

In addition to the advice given in the dietary guidelines, emphasis should be placed on eating foods with relatively low 'glycemic index' (GI).

It is also important to eat only sparingly foods that are high in saturated fats (such as full-fat dairy products, fatty meats, biscuits, cakes, pastries, potato chips and most other fried takeaway foods). Suitable replacements are whole-grain cereal foods, fruits and vegetables, foods rich in monounsaturated and polyunsaturated fats, including those that provide high levels of 'omega-3' fats. Fish (especially those with dark-flesh) is an excellent source of omega-3 fats. It is now usually recommended that we eat two or three fish meals (preferably not fried or battered) per week. Green leafy vegetables are also a good source.

Other good sources of health-promoting fats include avocado, nuts, seeds (pumpkin, sunflower), canola oil, olive oil, sunflower oil, soybean oil, peanut oil, and margarine spreads.

The increased risk of stroke and heart disease from high blood pressure means that careful attention should be paid to the dietary guideline on salt (sodium chloride): 'Choose foods low in salt'. Low salt foods are defined in the food regulations as having a sodium content not exceeding 120 mg/100 g. With the requirement (from 31 December 2002) to include sodium content in a 'nutrition information panel' on the label, reading the labels on supermarket foods will allow you to identify those processed foods that are 'low salt'.

The dietary guideline on alcohol (see [Appendix C](#)) recommends that alcohol intake be 'limited'. The National Health and Medical Research Council has published guidelines on safe levels of alcohol consumption. These guidelines are that the safe range for a woman is zero to two standard drinks, and for a man zero to four standard drinks, per day. A 'standard drink' is one that contains about 10 g of alcohol. Examples are 285 mL of full-strength beer (a 'pot' or 'middy'); 375 mL of reduced-alcohol beer; 30 mL (a 'nip') of spirit or liqueur; 60 mL of fortified wine such as port or muscat; and 120 mL (a small glass) of Australian table wine.

(iii) Lose some weight (if overweight or obese--see Appendix B for a guide to whether or not you probably need to lose weight)

Weight loss should result from increasing physical activity and making appropriate alterations to diet, as recommended above. Weight loss has beneficial effects on several components of metabolic syndrome, including the risk of developing insulin resistance. Although only a relatively small percentage of those with insulin resistance do progress to type 2 diabetes, everyone who does develop type 2 diabetes did experience insulin resistance first, so it is an indicator that you are 'at risk' of developing diabetes. Because developing insulin resistance increases with increasing body fat levels, weight reduction should lower the risk of insulin resistance. It has been reported that carrying as little as 11 kg of excess body fat during early adulthood increases the risk of later onset of type 2 diabetes twenty-fold.

Also with respect to weight, if you have recently undergone significant weight gain, despite attempting to use diet and physical activity to maintain normal weight, you would be well-advised to ask your doctor to check for insulin resistance. You might also like to ask if your doctor believes that a 'glucose tolerance test' would be appropriate, measuring both 'glucose response' and 'insulin response'.

A reduction in body fat also almost invariably leads to improved blood pressure. So losing weight reduces the risk of stroke, because high blood pressure is the strongest individual risk factor for stroke.

Although regaining the 'healthy weight range' (see [Appendix C](#)) would be ideal, this is not essential for significant health benefits. Losing about 5-10% of your current weight (if you have substantial excess body fat) will have worthwhile effects on several aspects of metabolic syndrome. Although 5-10% may not seem a lot, it can actually be quite a high percentage of your initial body fat level. For example, if you weigh 75 kg and have a body fat level of 33% (indicative of mild obesity), your body fat content is ~25 kg. Losing 10% (7.5 kg) of your body weight as fat means that you have lost about 30% of your body fat.

(iv) Quit smoking (if you are a smoker)

Smoking is associated with increased risk of heart disease (in addition to other conditions not directly related to metabolic syndrome, including lung cancer, bronchitis, emphysema and impotence). Quitting smoking is one of the healthiest lifestyle alterations that can be made by a person who smokes.

(v) Reduce stress levels

Although not necessarily a direct cause of metabolic syndrome, our increasingly busy lifestyles and other sources of stress have profound influence on health outcome. Light physical activity, meditation, yoga, music and/or other relaxation techniques can all be used to reduce stress.

(vi) Take any medications prescribed by your doctor

These may be to:

assist with control of blood pressure; improve levels of blood cholesterol and triglycerides; aid with appetite control and body fat reduction; assist in smoking cessation; and/or help with stress management.

Appendix A: Criteria for Metabolic Syndrome (with all blood levels in the fasting state)

For metabolic syndrome to be diagnosed, at least three of the following apply concurrently:

Waist circumference > 102 cm (men); 88 cm (women)

Serum triglycerides \geq 1.69 mmol/L

HDL cholesterol < 1.04 mmol/L (men); 1.29 mmol/L (women)

Blood pressure \geq 130/85 mm Hg

Serum glucose \geq 6.1 mmol/L.

Appendix B. Weight Categories and Determination of Body Fatness

Weight for height is calculated according to the 'body mass index' (BMI). BMI is calculated as weight (in kilograms) divided by height-squared, where height is measured in metres.

As an example, a large man (e.g. an AFL ruckman or rugby forward) might be 2.00 m tall and weigh 100 kg. His BMI is then $(100/2^2) = 25.0$

Weight categories are:

BMI below 18.5 is defined as 'underweight'

BMI between 18.5 and 24.9 is 'normal weight' or 'healthy weight range'

BMI of 25.0 - 29.9 is defined as 'overweight'

BMI of 30.0 and above is defined as 'obese'

However, fat in the abdomen is more strongly associated with adverse health outcome than fat deposited elsewhere in the body. BMI alone is not necessarily a good predictor of your total body fat level, or of your level of abdominal fat. Therefore, you need to take into account waist circumference as well as BMI to determine how 'healthy' you are with respect to total fat and body fat distribution. To measure waist circumference, pass a tape measure horizontally around your waist at the level of the navel, breathe out, and measure the circumference before you breathe in again. A waist circumference greater than about 102 cm (men) or 88 cm (women) indicates excessive abdominal fat.

There may also be differences between people of different origins with respect to appropriate BMI and waistline circumferences. For example, for the same BMI and waist circumference, Australian Aborigines, people of Asian origin and South Pacific islanders appear to be at higher risk of developing metabolic syndrome than people of European origin.

Appendix C. Australian Dietary Guidelines relevant to the prevention and treatment of metabolic syndrome

Maintain a healthy body weight by balancing physical activity and food intake; Eat a diet low in fat and, in particular, low in saturated fat; Choose low salt foods and use salt sparingly. Eat plenty of breads and cereals (preferably wholegrain), vegetables (including legumes) and fruits; If you drink alcohol, limit your intake; and Eat only a moderate amount of sugars and food containing added sugars.

Disclaimer: This material is provided on the basis that it constitutes advice of a general nature only. It is not intended to replace the advice of a physician or a dietitian.