

What is the metabolic syndrome?

The metabolic syndrome is a group of risk factors that increases your risk of developing [diabetes](#), heart disease, and stroke. A person is diagnosed with the metabolic syndrome if they have 3 out of the following 5 risk factors

1 : higher-than-normal blood sugar, blood pressure, or triglyceride levels; a large waistline; and low HDL (good) cholesterol. The table below explains each risk factor in more detail. The metabolic syndrome does not usually have any immediate symptoms — the medical problems it causes develop gradually over time. Your doctor can diagnose the metabolic syndrome with a physical exam and simple blood tests.

The metabolic syndrome is also known as *insulin resistance syndrome*. It used to be called *metabolic syndrome X*; however, it should not be confused with cardiac [syndrome X](#) (chest pain without signs of blockage in the arteries of the heart).

Do I have the metabolic syndrome?

Criteria for Diagnosis of the Metabolic Syndrome	2
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Risk Factors (any 3 of 5)

Criteria

Large waistline†

Waist measurement more than 35 inches in women (40 inches in men)

Higher-than-normal triglycerides

150 mg/dL or higher*

Low HDL (“good”) cholesterol

Less than 50 mg/dL in women (40 mg/dL in men)*

Higher-than-normal blood pressure

One or both of the following:

130 mm Hg or higher* (top number)

85 mm Hg or higher* (bottom number)

Higher-than-normal blood sugar

Fasting blood sugar 100 mg/dL or higher*

†In Asian Americans, the cutoff is 31 inches or more in women (35 inches in men). Some people of non-

* or

How common is the metabolic syndrome?

About 22% of all US adults (47 million people) have the metabolic syndrome. The chances of developing the metabolic syndrome increase as you get older, and more than 40% of people older than 60 years of age have this syndrome.³ African-American women are 57% more likely to have the metabolic syndrome than African-American men, and Mexican-American women are 26% more likely to have the metabolic syndrome than Mexican-American men.

³

There is no gender difference for white men and women.

US Prevalence of the Metabolic Syndrome ³

Race

Women

Men

White

23%

25%

African American*

26%

16%

Mexican American *

36%

28%

Other

20%

21%

*Statistically significant gender difference

What causes the metabolic syndrome?

No single cause of metabolic syndrome has been proven, and it is possible that there are different causes in different people. The underlying factors that contribute to developing metabolic syndrome are being [overweight or obese](#) , not getting enough [exercise](#) , and genetic factors that make you susceptible.

What is the connection between blood sugar and the metabolic syndrome?

In many people, the metabolic syndrome seems to be tied to a disorder called insulin resistance. Insulin is a hormone released by the pancreas that helps glucose (sugar) enter your body's cells. Insulin resistance is when your body can't use insulin efficiently, causing an increased amount of sugar in your blood. This high blood sugar can lead to type 2 diabetes. Metabolic syndrome usually happens when your blood sugar is higher than normal, but not high enough to be classified as diabetes. Exactly how this happens is not known, and some people with the metabolic syndrome don't have insulin resistance. Insulin resistance increases the levels of cholesterol and triglycerides in your blood, causing damage to your arteries, and may interfere with your kidneys' ability to process salt, raising blood pressure.

Who is at risk for insulin resistance?

Some people are more likely than others to develop insulin resistance. Often this is due to genetic factors, such as a family history of diabetes. Women with a history of polycystic ovary syndrome (when the body produces too many male hormones) are more likely to develop insulin resistance, as are women who have had diabetes during pregnancy (see [gestational diabetes](#)). In people with a predisposition to insulin resistance, being overweight and not getting enough exercise may trigger the metabolic syndrome.

How does the metabolic syndrome affect heart disease risk?

The metabolic syndrome increases your risk of dying from heart disease, having a heart attack, stroke, or other heart problems, and developing diabetes.^{4,5}

The Third National Health and Nutrition Examination Survey, a study of more than 10,000 patients, found that the metabolic syndrome doubled the risk for heart attack and stroke in both men and women.⁶ In one study of more than 700 women, those who had heart disease and the metabolic syndrome were more likely to die or have a heart attack or stroke than women with heart disease who did not have metabolic syndrome.⁷

Although 3 components are required for a diagnosis of metabolic syndrome, having even 1 of these risk factors makes you more likely to gradually develop the others. Each risk factor increases your risk for heart disease and stroke, and the more components of the metabolic syndrome you have, the higher your risk.⁸

How can the metabolic syndrome be prevented?

Even if you already have 1 or 2 of the risk factors that are part of the metabolic syndrome, you can take steps to prevent getting the syndrome and the serious risks that come with it. The safest and most effective way to do this is by making heart-healthy lifestyle changes.

- Weight control: If you are [overweight or obese](#) , particularly if you have excess fat around the waist, you are at increased risk for developing metabolic syndrome.
- Exercise: As little as 30 minutes a day of moderate [exercise](#) can help you lose weight, lower your insulin levels, blood pressure, and LDL (bad) cholesterol, increase HDL (good) cholesterol, and reduce your risk of developing diabetes and heart disease⁹
- Diet: Eating a heart-healthy diet will help you lose weight and reduce your risk of developing heart disease or diabetes. See also: Diet FAQ

Sometimes lifestyle changes aren't enough to fully reduce your risk factors. You may need medications to improve some risk factors such as [high blood pressure](#) and [high cholesterol and lipids](#) .

How is the metabolic syndrome treated?

The goal of treating the metabolic syndrome is to prevent type 2 diabetes, heart disease, heart attack, and stroke. The same lifestyle changes that help prevent the metabolic syndrome (weight control, changing your diet, getting more exercise, and quitting smoking) also help if you are diagnosed with the metabolic syndrome. Improving your diet and exercising can delay or prevent the metabolic syndrome from progressing to type 2 diabetes.¹⁰

What medications are used to treat the metabolic syndrome?

In addition to lifestyle changes, your doctor will consider medication to further lower your risk factors and prevent heart disease. These may include [aspirin](#) , [high blood pressure medicine](#) , and [cholesterol-lowering drugs](#)

. If you have the metabolic syndrome, your doctor may recommend an even lower LDL cholesterol goal than usual (less than 70 mg/dL compared with a goal of less than 100 mg/dL).
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Although there are drugs that can treat insulin resistance, these haven't been shown to reduce the risk of heart disease so they aren't regularly given to patients with metabolic syndrome.

References

1. Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) final report. *Circulation*. Dec 17 2002;106(25):3143-3421.
2. Grundy SM, Cleeman JI, Daniels SR, et al. Diagnosis and Management of the Metabolic Syndrome. An American Heart Association/National Heart, Lung, and Blood Institute Scientific Statement. *Circulation*. Sep 12 2005.
3. Ford ES, Giles WH, Dietz WH. Prevalence of the metabolic syndrome among US adults: findings from the third National Health and Nutrition Examination Survey. *JAMA*. Jan 16 2002;287(3):356-359.
4. Haffner SM, Valdez RA, Hazuda HP, Mitchell BD, Morales PA, Stern MP. Prospective analysis of the insulin-resistance syndrome (syndrome X). *Diabetes*. Jun 1992;41(6):715-722.
5. Girman CJ, Rhodes T, Mercuri M, et al. The metabolic syndrome and risk of major coronary events in the Scandinavian Simvastatin Survival Study (4S) and the Air Force/Texas Coronary Atherosclerosis Prevention Study (AFCAPS/TexCAPS). *Am J Cardiol*. Jan 15 2004;93(2):136-141.
6. Ninomiya JK, L'Italien G, Criqui MH, Whyte JL, Gamst A, Chen RS. Association of the metabolic syndrome with history of myocardial infarction and stroke in the Third National Health and Nutrition Examination Survey. *Circulation*. Jan 6 2004;109(1):42-46.
7. Marroquin OC, Kip KE, Kelley DE, et al. Metabolic syndrome modifies the cardiovascular risk associated with angiographic coronary artery disease in women: a report from the Women's Ischemia Syndrome Evaluation. *Circulation*. Feb 17 2004;109(6):714-721.
8. Malik S, Wong ND, Franklin SS, et al. Impact of the metabolic syndrome on mortality from coronary heart disease, cardiovascular disease, and all causes in United States adults. *Circulation*. Sep 7 2004;110(10):1245-1250.
9. Aronson D, Sella R, Sheikh-Ahmad M, et al. The association between cardiorespiratory fitness and C-reactive protein in subjects with the metabolic syndrome. *J Am Coll Cardiol*. Nov 16 2004;44(10):2003-2007.
10. Tuomilehto J, Lindstrom J, Eriksson JG, et al. Prevention of type 2 diabetes mellitus

by changes in lifestyle among subjects with impaired glucose tolerance. *N Engl J Med.* May 3 2001;344(18):1343-1350.

11. Grundy SM, Cleeman JI, Merz CN, et al. Implications of recent clinical trials for the National Cholesterol Education Program Adult Treatment Panel III Guidelines. *J Am Coll Cardiol.* Aug 4 2004;44(3):720-732.

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