

Metabolic Syndrome

(Syndrome X, Insulin Resistance Syndrome, Deadly Quartet)

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[En Español \(Spanish Version\)](#)

[More InDepth Information on This Condition](#)

What is Metabolic Syndrome? **NEW**

Definition

Metabolic syndrome is a group of risk factors of a metabolic origin that increase the risk of [diabetes](#) , [coronary heart disease](#) , [stroke](#) , and [peripheral vascular disease](#). In general, it is characterized by:

- Abdominal [obesity](#)
- [Dyslipidemia](#) —high triglycerides and low high-density lipoprotein (HDL, or “good”) cholesterol
- [Elevated blood pressure](#)
- Insulin resistance

Coronary Heart Disease



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Causes

Metabolic syndrome may be caused by:

- Genetic factors
- Insulin resistance
- Dietary factors

- Chronic low-grade inflammation
- Aging
- Lifestyle factors, such as:
 - Obesity
 - Lack of physical activity

Risk Factors

A risk factor is something that increases your chance of getting a disease or condition.

Risk factors for metabolic syndrome include the following:

- Overweight (especially excessive fat in the abdominal region)
- Sedentary lifestyle
- Age: over 60 years old
- Ethnicity: Latino/Hispanic American, African American, Native American, Asian American, Pacific Islander
- Family history of type 2 diabetes , high blood pressure , or cardiovascular disease
- History of glucose intolerance or gestational diabetes
- A diagnosis of any of the following conditions:
 - High blood pressure
 - Elevated triglycerides/low HDL-cholesterol
 - Cardiovascular disease
 - Polycystic ovary syndrome
 - Acute pancreatitis
 - Chronic kidney disease
 - Gender
 - African American: females more than males by 57%
 - Mexican American: females more than males by 26%

Symptoms

In general, metabolic syndrome causes no noticeable symptoms, except perhaps those related to obesity. Although, the diseases that may result from metabolic syndrome have symptoms, for example, those related to diabetes, heart disease, stroke, and poor leg circulation.

Diagnosis

The doctor will ask about your medical history, perform a physical exam, and order laboratory tests.

Tests may include:

- Blood tests to measure:
 - Fasting blood sugar levels (glucose) or a two-hour post-glucose challenge blood sugar level
 - Fasting insulin
 - Triglyceride level
 - HDL cholesterol level
- Blood pressure
- Calculation of body mass index (BMI) from weight and height
- Calculation of the 10 year risk of cardiovascular disease

There are several criteria for diagnosing metabolic syndrome. You may be diagnosed with metabolic syndrome if you have at least three of the following measures:

- Waist measurement—greater than 40 inches in Caucasian men (35 inches in Asian men) or 35 inches in Caucasian women (31 inches in Asian women)
- Fasting blood sugar (glucose)—greater than or equal to 100 milligrams per deciliter (mg/dL)
- Serum triglycerides—greater than or equal to 150 mg/dL
- Serum HDL (“good”) cholesterol—less than 40 mg/dL in men and less than 50 mg/dL in women
- Blood pressure—greater than or equal to 130/85 millimeters of mercury (mm Hg)

Treatment

The treatment of metabolic syndrome involves two parts: treatment of underlying causes and treatment of specific metabolic abnormality.

Treatment of Underlying Causes

- Reducing excess weight by at least 10% in the next 6 to 12 months
- Increasing physical activity to 30-60 minutes of moderate aerobic exercise four or more days per week
- Lowering blood pressure to below 130/85 mmHg with diet, exercise, and possibly medication
- Improving triglyceride and HDL cholesterol levels through diet, exercise, and possibly medication

Treatment of Specific Metabolic Abnormality

- High blood pressure—treated with medications (eg, angiotensin-converting enzyme inhibitors, angiotensin II receptor antagonists)
- Insulin resistance—treated with medications (eg, metformin, thiazolidinediones)
- High blood lipids—treated medications (eg, statins, ezetimibe, fibrates, nicotinic acid)
- Clotting tendency—treated with low dose aspirin, especially in those with moderate to high cardiovascular risk

Prevention

To help prevent metabolic syndrome:

- Achieve and maintain a healthful weight.
- Do 30 minutes of moderate aerobic exercise at least four days per week.
- See your healthcare provider regularly.

In addition, other unhealthy lifestyle factors also contribute to heart disease, stroke, and peripheral vascular disease. To lower your risk of these diseases:

- Eat a healthful diet, one that is low in saturated fat and rich in whole grains, fruits, and vegetables.
- If you smoke, quit.
- Drink alcohol in moderation only.

RESOURCES:

American Heart Association
<http://www.americanheart.org>

National Institute of Diabetes & Digestive & Kidney Diseases
<http://www.niddk.nih.gov>

CANADIAN RESOURCES:

Canadian Cardiovascular Society
http://www.ccs.ca/home/index_e.aspx

Canadian Diabetes Association
<http://www.diabetes.ca/>

REFERENCES:

Deen D. Metabolic syndrome: time for action. *Am Fam Physician* . 2004;69:2875-2882.

Eckel RH, Grundy SM, Zimmet PA. The metabolic syndrome. *Lancet* . 2005;365:1415-1428.

Findings and recommendations from the American College of Endocrinology on the insulin resistance syndrome. American Association of Clinical Endocrinologists website. Available at: <http://www.aace.com> . Accessed January 17, 2003.

Gami AS, Witt BJ, Howard DE, et al. Metabolic syndrome and risk of incident cardiovascular events and death. *J Am Coll Cardiol* . 2007;49:403-414.

Grundy SM, Brewer HB, Cleeman JI, et al. American Heart Association, NHLBI. Definition of metabolic syndrome: report of the NHLBI/AHA conference on scientific issues related to definition. *Circulation* . 2004;109:433-438.

Grundy SM, Cleeman JI, Diniels SR, et al. AHA/NHLBI Diagnosis and management of the metabolic syndrome: an AHA/NHLBI Scientific Statement. *Circulation* . 2005;112:2735-2752.

National Heart, Lung, and Blood Institute. Available at: <http://www.nhlbi.nih.gov> .

National Institute of Diabetes & Digestive & Kidney Diseases. Available at: <http://www.niddk.nih.gov> .

Reaven GM. The metabolic syndrome or the insulin resistance syndrome? Different names, different concepts, and different goals. *Endocrinol Metab Clin North Am* . 2004; 33: 283-304.

Syndrome x or metabolic syndrome. American Heart Association website. Available at: <http://www.americanheart.org> . Accessed January 17, 2003.

Wright Jr JT, Harris-Haywood S, Pressel S, et al. Clinical outcomes by race in hypertensive patients with and without the metabolic syndrome (ALLHAT). *Arch Int Med*. 2008;168:207-217.

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