Japanese eating habits and dietary components have clearly changed in recent years. Lifestyles that include overnutrition and physical inactivity are threatening to increase the incidence of coronary artery disease (CAD) and stroke. Among the conditions underlying the development of atherosclerotic cardiovascular diseases (CVD), particular importance is ascribed to a cluster of multiple risk factors, including hyperglycemia, dyslipidemia, and elevated blood pressure, which are closely related to lifestyle.

This pathologic condition used to be called “Syndrome X,” the deadly quartet,” “visceral fat syndrome,” or “insulin resistance syndrome,” but those terms were unified as “metabolic syndrome” in 1999. Metabolic syndrome is recognized as a condition in which the risk factors of atherosclerosis cluster on the basis of obesity, particularly visceral fat accumulation, due to overnutrition and physical inactivity.

1. Importance of Accumulated Risk Factors

The Group of “The Research for the Association between Host Origin and Atherosclerotic Diseases under the Preventive Measure for Work-related Diseases of the Japanese Ministry of Labour” performed a case-control study in approximately 120,000 office workers. The records of annual medical health checkups performed 10 years prior to the onset of CAD were reviewed for 94 individuals who developed CAD during a 3-year observation period and were compared to those of age- and gender-matched controls who were randomly selected from the same workplace of the patient. The surveys revealed that the
2. Diagnostic Criteria for Metabolic Syndrome

The definition of metabolic syndrome in Japan, which is characterized by the accumulation of visceral fat accompanied by the concurrence of multiple risk factors including elevated blood pressure, dyslipidemia, and hyperglycemia, was established in 2005 (Table 1). In the diagnostic criteria, waist circumference is used as an index of visceral fat accumulation for practical convenience, and individuals with metabolic syndrome are defined as those having visceral fat accumulation demonstrated by increased waist circumference and 2 or more risk factors. The International Diabetes Federation also published diagnostic criteria for metabolic syndrome based on the same concept. The joint statement of NCEP-ATP III and several societies in Western countries proposed that individuals with three of the five risk factors, including abdominal obesity, hypertriglyceridemia, hypo-HDL-cholesterolemia, high blood pressure, and high blood glucose, should be diagnosed as having metabolic syndrome. The Western diagnostic criteria consider the absolute risk for the development of cardiovascular events and type 2 diabetes.

In contrast to the Western criteria, the Japanese criteria emphasize that the syndrome develops based on visceral fat accumulation. The purpose of the Japanese criteria is to decrease risk factors through interventions to reduce visceral fat. The compulsory measurement of waist circumference in workplace annual health checkups and the specific health examination began in 2008; this action was intended to prevent diabetes and atherosclerotic CVD based on the concept of metabolic syndrome.

According to a recent large-scale cross-sectional study conducted in Japan on visceral fat area and accumulated risk factors, the average number of obesity-related cardiovascular risk factors (dyslipidemia, high blood pressure, and high blood glucose) was more than 1.0 at 100 cm² for visceral fat area in both men and women. The criteria for waist circumference in Japan were determined by the absolute visceral fat area of 100 cm²; this differs from the Western criteria, which are based on the value corresponding to the obesity criteria in each country.

3. Disease Concept of Metabolic Syndrome and its Significance

Conditions, such as metabolic syndrome, that involve the clustering of multiple risk factors (using WHO or NCEP-ATP III definition) have been shown to increase the risk of CVD in comparison to a single risk factor in epidemiological studies in Japan, includ-
Metabolic Syndrome

Components of metabolic syndrome: Obesity, impaired glucose tolerance, lipidosis, hypertension, hyperinsulinemia


Fig. 2. Relationship between the number of concurrent risk factors and incidences of coronary artery disease and cerebral infarction

Components of metabolic syndrome: Obesity, impaired glucose tolerance, lipidosis, hypertension, hyperinsulinemia


4. Relationship to Hyper-LDL-Cholesterolemia

A global consensus has been reached that high-LDL-cholesterolemia is a major risk factor for atherosclerotic CVD, and its management protocol has been established. Metabolic syndrome has been proposed as a high-risk condition for CVD independent of high-LDL-cholesterolemia. Therefore, the diagnostic criteria of metabolic syndrome include no criterion concerning the LDL-C level. However, subjects with metabolic syndrome sometimes also present an elevated level of plasma LDL-C. The combination of metabolic syndrome and high-LDL-cholesterolemia will further increase the risk of CVD. Therefore, strong recommendations to reduce visceral fat and a comprehensive approach for multiple risk factor control, including high-LDL-cholesterolemia, are necessary in such cases.

Footnotes

This is an English version of the guideline from the Japan Atherosclerosis Society (chapter 8) published in Japanese in June, 2012.

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