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Waist Circumference in the Diagnosis of Metabolic Syndrome Debate and Solution

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Editorial

In response to increasing rates of obesity and associated chronic disease, Japan has implemented several policies, guidelines and programs [1]. Kenko Nippon 21 (Health Japan 21) began in 2000, followed by the Shokuiku (eating education) Basic Law which was passed in 2005. Subsequently, in 2008, the government launched a special health check-up (tokuteikenkoshinsa), involving measurement of Waist Circumference (WC) and nutrition counseling to reduce metabolic syndrome.

Concept of Metabolic Syndrome

The concept of metabolic syndrome was proposed by several committees, although there had considerable disagreement over the definition and diagnostic criteria. The use of the definitions to conduct research into the metabolic syndrome resulted in wide ranging prevalence rates, inconsistencies and confusion, and spurred on the vigorous debate regarding how the metabolic syndrome should be defined [2-4].

The first definition of criteria referring to abdominal obesity was proposed by the National Cholesterol Education Program Adult Treatment (ATPIII) in 2001. ATPIII adopted abdominal obesity estimated by the Waist Circumference (WC) rather than by Body Mass Index (BMI) in addition to hypertriglyceridemia, low HDL-cholesterol, high blood pressure, and hyperglycemia.

In 2005, the International Diabetes Foundation (IDF) reported a new diagnostic criterion of metabolic syndrome, making abdominal obesity an essential factor required in the diagnosis [5]. The representatives of the IDF, the International Atherosclerosis Society, and the American Heart Association/National Heart, Lung and Blood Institute agreed that abdominal obesity should not be a prerequisite for the diagnosis, requiring the present of any three of five factors. They also suggested that abdominal obesity should be defined based on the national cutoff point of each country [1,3]. Most countries accept the criteria of IDF, but in China, central obesity is defined as WC >90 cm for men and >80 cm to >85 cm for women. It may cause over diagnosis for women and under diagnosis for men.

Controversies on the significance and cutoff point of WC may have arisen from a misunderstanding of the purpose and the significance of the measurement of WC [4]. So far, visceral adiposity measured by CT scan is a golden standard, and it fit to the pathophysiology of metabolic syndrome.

As developing countries are simultaneously facing increasing obesity and lifestyle diseases, collaboration in research and programs is urgently needed to prevent disease through dietary intervention [6].

Intervention of Metabolic Syndrome to Show Plausible WC

Matsuzawa [3] accumulated data of abdominal CT scan in relationship to adiposity and diseases, and the Japanese committee adopted a cutoff point of 100 cm^2 of visceral fat area for both men and women, because the risk of metabolic syndrome increased over this point in both men and women simultaneously. WC that corresponded to visceral fat of 100 cm^2 was 85 cm in men and 90 cm in women. The cutoff point in Japan was the only one that was based upon visceral fat area for the prevalence of diseases. The first nationwide lifestyle intervention program to improve the risk factors for metabolic syndrome in healthy adults was recently reported by Tushita et al. [7].

They used the registry of Specific Health Checkups and Specific Health Guidance focusing on metabolic syndrome in middle aged adults, 40 years to 74 years of age, beginning in 2008 with follow-up period of 3 years. Number of participants to the program was 31,790 and non-

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participated controls were 189,726. Body weight reduction was 1.98 kg (participants) and 0.42 kg (non-participants), and WC reduction was 2.34 cm in men and 2.98 cm in women by the intervention, while among controls it was unchanged for 3 years [7].

It could be conclusive that the WC of Japanese criteria is appropriate avoiding both over diagnosis and under diagnosis. WC reflects both visceral fat and subcutaneous fat of the abdominal wall, so women in middle life usually have more subcutaneous fat than visceral fat. Similar distribution is found among sumou wrestlers.

We also confirmed the WC of 85 cm for men and 90 cm for women was fit to 100 cm^2 visceral fat areas by CT scan in the SCOP study, and intervention to improve obesity was associated with the increase of adiponectin and decrease of leptin [8-10]. The inverse relationship of leptin and adiponectin during successful intervention supported the central role of abdominal fat in metabolic syndrome [11].

Dietary Intervention to Solve Metabolic Syndrome

Since the seven countries study, several dietary habits are recommended. Japanese cuisine is one of good example. Unpolished brown rice contains various functional ingredients, and it could be called "medical rice" for preventing various diseases [12].

Obesity is given to one of big causes of type 2 diabetes; The Japanese risk of diabetes from obesity is several times higher than that of Western white [13]. At BMI 30, prevalence of diabetes among Caucasians was only 8%, while it is almost 25% among Japanese.

To reduce the incidence of diabetes, it becomes important to control the obesity. We started the Genki Study (genmai epidemiology and nutrition kenko innovation) to find the health effects of unpolished brown rice [14]. Baseline analysis showed that brown rice eaters are very healthy, and the odds ratio of drug use such as diabetes, hypertension, hyperlipidemia and angina was 0.2 to 0.3. On the contrary, obese people had diabetes, hypertension, gout, hyperlipidemia with the odds ratio of 2-3 times. Brown rice eating is a basis of healthy dietary habit to cause wellness [15,16].

Tailor Made Nutrition: Solution for Metabolic Syndrome

Control of energy intake is essential to maintain healthy body weight. However, the units of kcal or MJ are not easily used or measured in daily life. Serving size or portion size is used in many food guidelines, but these do not provide quantitatively accurate bases for consumption. Use of a new energy unit (1E-Unit=80 kcal) leads to a simple equation where the necessary energy units=body weight (kg) x 0.4 for daily intake throughout most of adult life including both sexes, the elderly and even pregnant women. For example, a 60 kg man needs 24 E-units, so 8 E-units can be eaten at breakfast, lunch and dinner. For growing children, the coefficient is modified from 1 to 0.4 for body weight ranges starting at 10 kg and going up to 60 kg.

The Comprehensive Food Icon (FI) includes information about energy units, balance of major nutrients and Antioxidant Units (AOU) as a surrogate marker of vegetables and fruits.

Widespread adoption and utilization of this food icon by food producers, suppliers and consumers will support people who want to control body weight [17].

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