

COMMENTARY

The challenge of stopping the knocking down of metabolic dominos upstream

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The concept of the metabolic domino¹ has become well known, not only to doctors but also to the general population in Japan. The Japanese people are familiar with metabolic syndrome in part because the Japanese Ministry of Health, Labor and Welfare has, since 2008, promoted a special checkup for the general population that focuses on metabolic syndrome.² This national campaign was started as part of the promotion of a set of measures called 'Health Japan 21' that counteracts lifestyle-related disease. The goal of this campaign is to reduce the cost of medical care by improvements in lifestyle and earlier detection of premature cardiovascular disease. As a result, the main focus of the program is health checkups and the prevention of severe cardiovascular events, such as myocardial infarction or stroke, through the dissemination of appropriate nutrition information as well as the promotion of physical activity and exercise. The Ministry of Health, Labor and Welfare and the Ministry of Agriculture, Forestry and Fisheries jointly compiled a document entitled 'Dietary Guidelines for Japanese' and promoted a food and nutrition education program named 'Shokuiku'.

Even though the central concept of metabolic syndrome^{3,4} is based on visceral fat accumulation, hypertension also has a large role. The Japanese Society of Hypertension Guidelines for the Management of Hypertension (JSH2009)⁵ clearly state that the main diseases related to metabolic syndrome are cardiovascular disease and diabetes mellitus and that the target range for blood pressure control is <130/85 mmHg. In the table of

risk stratification in JSH2009, the subjects with high-normal blood pressure (130–139/85–89 mmHg) and metabolic syndrome are classified into risk stratum 2. The initial treatment for metabolic syndrome is the correction of abdominal obesity through dietary and exercise therapies. In the chapter on lifestyle modification in JSH2009, salt restriction, maintenance of appropriate body weight, exercise, alcohol restriction and cessation of smoking are recommended as effective techniques to reduce blood pressure and prevent hypertension. Asian populations are genetically predisposed to hypertension⁶ and metabolic syndrome⁷ because of higher salt sensitivity. As a result, control of body weight and reduction of visceral fat are critical to preventing future cardiovascular disease.

Recently, physicians have started administering medication in the early stages of lifestyle-related diseases, using drug therapy to achieve strictly defined target levels for various health indicators. For example, the results obtained from a 10 year follow-up in the United Kingdom Prospective Diabetes Study clearly suggested the importance of tightly controlling glucose levels in early-stage diabetes.⁸ In the same study, only the subjects who maintained a healthy blood pressure level continuously during the study period received the benefits of risk reduction for cardiovascular disease.⁹ In the treatment of hypertension, preventing onset of diabetes is an important issue. The Candesartan Anti-hypertensive Survival Evaluation in Japan trial¹⁰ showed that treatment using an angiotensin II receptor blocker, candesartan, had a more significant benefit in new-onset diabetes than did a Ca channel blocker, amlodipine. In the Trial of Preventing Hypertension (TROPHY) study,¹¹ earlier use of an angiotensin II receptor blocker in subjects with prehypertension suppressed the onset of hypertension.

In contrast, recent results obtained from the Action to Control Cardiovascular Risk in Diabetes study¹² suggest that intensive blood pressure control (<120 mmHg), as compared with moderate control (<140 mmHg), does not reduce the rate of a composite outcome of fatal and nonfatal major cardiovascular events in patients with diabetes at high risk for cardiovascular events. These results suggest that earlier and continuous 'optimal' control of blood pressure and glucose reduces the risk of knocking down metabolic dominos and prevents hypertension, diabetes and cardiovascular disease. However, lagging and excessive control of blood pressure or glucose levels is not always a good thing for patients.

The idea of stopping the chain reaction of cardiovascular risks can be expressed using the metaphor of knocking down dominos. The size of the dominos increases from upstream to downstream. In other words, disease severity and medical care expenditures increase as more dominos are knocked down. Thus, stopping dominos from being knocked down upstream is most important for public health.

Otsuka *et al.*¹³ examined the correlation between the number of metabolic syndrome components and dietary factors in middle-aged and elderly Japanese subjects; their results indicated that different dietary factors are correlated with metabolic dominos in males and females. Even though the number of subjects examined was small, the results obtained seem useful when considering early interventions that prevent the knocking down of dominos. A low intake of vitamin B₆ and dietary fiber was associated with the number of metabolic components found in males. In females, a high intake of cereal and a low intake of calcium, milk and dairy food predisposed women to metabolic syndrome.

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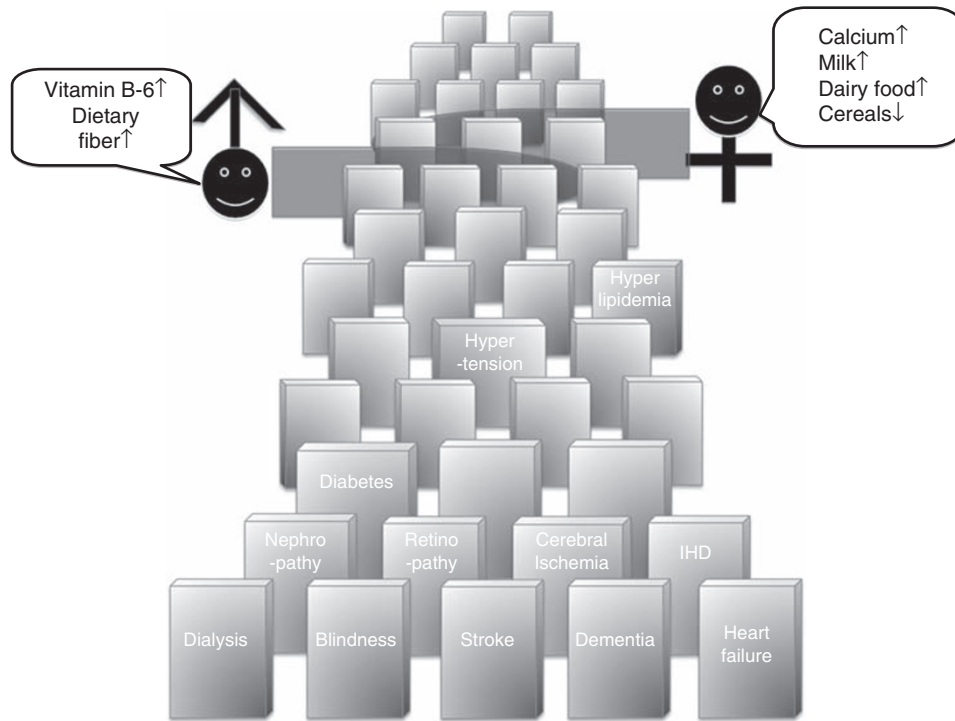


Figure 1 Ways to put an early stop to the metabolic domino effect. Useful lifestyle modifications, which differ for men and women, to stop the knocking down of metabolic dominos upstream.^{1,13}

It is conceivable that lifestyle modifications to address these findings could decrease the risk of knocking down metabolic dominos upstream (Figure 1). In younger generations in Japan, obesity is a social issue for men, and excess weight loss is a major problem for women. Young Japanese women tend to be anorexic because of their desire to be slim. As a result, the number of low-birth-weight babies is increasing, which will lead to an increase in future rates of metabolic syndrome.¹⁴ Thus, this investigation may be relevant to education programs such as ‘Shokuiku’ that address the optimal diet for younger generations. The conscious control of diet in daily life has an important role as a useful and thrifty strategy to stop the knocking down metabolic dominos.

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