

## The Emerging Role of Dairy Foods in Reducing the Risk of Metabolic Syndrome and Type 2 Diabetes

By Lisa A. Spence

**M**etabolic syndrome describes a cluster of metabolic abnormalities that are risk factors for cardiovascular disease and type 2 diabetes, including abdominal obesity, hypertension, elevated fasting glucose, elevated triglycerides, and low high-density lipoprotein (HDL) cholesterol.

Worldwide, 197 million people have impaired glucose tolerance due to obesity and metabolic syndrome, and it is estimated that by 2025, this number will rise to 420 million. Key recommendations for preventing and managing metabolic syndrome include weight loss, increased physical activity, and dietary changes that follow the 2005 Dietary Guidelines, including a reduction in calories within a diet low in saturated fat, trans fat, and cholesterol, and an increase in consumption of low-fat dairy products, fruits, vegetables, and whole grains.

The role of specific foods and/or nutrients as important factors in the prevention and management of metabolic syndrome and type 2 diabetes is an emerging area of research. A growing body of evidence demonstrates that dairy food consumption may not only lower elevated blood pressure and adiposity, two components of metabolic syndrome, but also may reduce the incidence of metabolic syndrome and type 2 diabetes, which is often a subsequent consequence.

Dietary patterns with high dairy intake are associated with reduced risk of the components of metabolic syndrome, which is in contrast to the traditional belief that dairy foods contribute to development of risk factors for cardiovascular disease due to the association with high dietary cholesterol, saturated fat, and protein. Populations consuming dairy products are at lower risk of developing type 2 diabetes as well as metabolic syndrome than populations consuming a low dairy food diet. A recent review reported that the risk for incidence of type 2 diabetes was 14% lower for those individuals consuming greater dairy intakes (three to five servings per day) compared with those with lower dairy intakes (<1.5 servings/day).

Several reports have shown an inverse association between dairy consumption and incidence of metabolic syndrome and type 2 diabetes in various population groups and in both men and women. Greater dairy consumption was associated with reduced incidence of metabolic syndrome in a cohort of adults from Iran and the UK. A study of more than 10,000 middle-aged and older U.S. women reported that those consuming the highest dairy intakes had a 34% reduction in risk of metabolic syndrome versus those consuming the lowest dairy intakes. Similar findings have been reported in men with dietary patterns including milk/dairy products, bread, cereal grains, and fish being associated with a lower risk of metabolic syndrome.

Additionally, the Coronary Artery Risk Development in Young Adults study, which studied ~3000 black and white men and women over a 10-year period, reported a 72%

lower risk of developing metabolic syndrome in individuals overweight at baseline who consumed five or more dairy servings per day compared with those consuming only 1.5 servings. In the Malmo Diet and Cancer cohort in Sweden, increased dairy food consumption in women provided a protective effect against the development of type 2 diabetes. In two large prospective studies, each additional daily serving of dairy was associated with a 4% lower risk in women followed for 10 years and a 9% lower risk in men followed for 12 years of developing type 2 diabetes.

While the above-mentioned studies have shown associations, some studies have demonstrated direct impact of dairy consumption and components of metabolic syndrome, e.g., high blood pressure and adiposity, which are also risk factors for type 2 diabetes. The DASH study (Dietary Approaches to Stop Hypertension) evaluated the effects of a healthy diet including low-fat dairy products (milk, yogurt, and cheese), fruits, and vegetables on blood pressure in ~450 subjects for eight weeks. Results showed that the combination of fruits, vegetables, and low-fat dairy, "the DASH diet," resulted in the greatest reductions in blood pressure compared with the "typical American diet," whereas the fruit and vegetable diet that excluded dairy products was about half as effective as the DASH diet.



Another study examined the effects of the DASH diet in subjects with metabolic syndrome. Compared with the control diet, the DASH diet led to increased HDL, lower triglycerides, lower blood pressure, weight loss, and reduced fasting blood glucose in both men and women. Clinical, observational, and animal model studies support a relationship between the consumption of dairy foods and weight management.

Although much remains to be learned about the role of dietary factors in the prevention and treatment of metabolic syndrome, the potential protective role of dairy products on metabolic syndrome and type 2 diabetes is emerging. Observational studies and clinical trials have indicated that dairy consumption may have beneficial effects on reducing body weight, body fat, abdominal fat, blood pressure, and possibly incidence of metabolic syndrome and risk for type 2 diabetes. For future research, the focus should be placed on randomized clinical trials to investigate the direct effects of dairy and its components on metabolic syndrome and risk of type 2 diabetes.

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