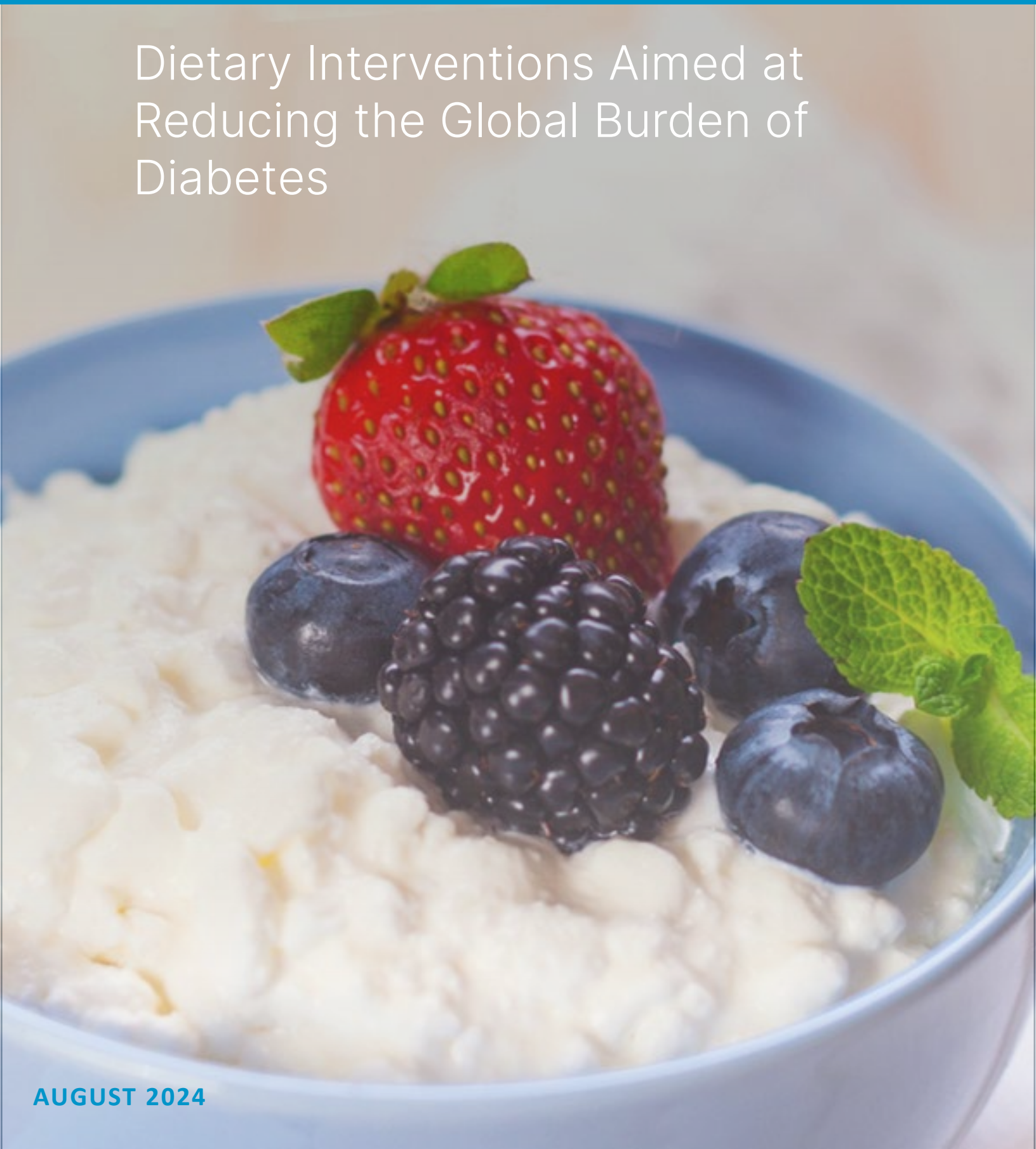
GLOBAL DAIRY PLATFORM

Perspective Paper

Dietary Interventions Aimed at Reducing the Global Burden of Diabetes



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KEY TAKEAWAYS:

- Type 2 diabetes (T2D) is at epidemic proportions. Projections indicate that global T2D rates will continue to rise over the next several decades, particularly in developing countries.
- Diet is a key issue that can raise or lower one's risk of developing diabetes. Diet is also important for diabetes management.
- In multiple observational and clinical trials, total dairy intake has been shown to be protective against T2D risk.
- Research indicates that total dairy, particularly low-fat and fermented dairy, intake is strongly correlated with protection against the development of T2D. High fat dairy has a neutral effect on the genesis of the disease.
- The nutrient dense nature of dairy, and its high-quality protein, make dairy an important food in medical nutrition therapy designed for T2D management and prevention.

Global data regarding the incidence and risk of diabetes are staggering. Statistics from the International Diabetes Federation (IDF) indicate that 540 million people worldwide had diabetes in 2021, 90% of whom had T2D. This represents about 10.5% of the adult population around the world, half of whom are unaware that they have the condition.

Future projections regarding global diabetes rates are not promising, with the number of cases expected to rise to 643 million by 2030. By 2045, IDF indicates that 1 in 8 adults, roughly 783 million people, will be living with diabetes – a 46% increase compared to recent years.

With these issues in mind, Global Dairy Platform (GDP) invited two international diabetes experts, Dr. Anthony Hanley from the University of Toronto, and Dr. Osama Hamdy from the Joslin Diabetes Center and Harvard Medical School in Boston, to address the global burden of diabetes and what can be done about it, as part of GDP's Quarterly Webinar Series.

Since diet is such an important part of diabetes – both in potentially causing the onset of diabetes as well as how to manage it successfully – both experts focused on food-related nutritional science, including the role of dairy foods.

This perspective summarizes findings from the body of literature the two internationally renowned experts presented.

Diabetes Rates Around the World

The incidence of T2D is leveling off in some regions of the world, particularly in high-income countries with the resources available to better treat the disease. In areas like South America, sub-Saharan Africa and Southeast Asia, regions not generally equipped with the resources to combat the condition, the prevalence of T2D continues to increase. Recent data indicate, however, that no region is immune to rising diabetes rates, and that by mid-century the prevalence of T2D will likely increase worldwide.

Causes and Risk Factors for Diabetes

The vast majority of diabetes cases worldwide are T2D, a condition that can take decades to manifest itself in susceptible individuals. It is a disease that generally occurs as a result of progressive insulin resistance, meaning that tissues like the liver, skeletal muscle, and adipose (fat stores in the body) become more resistant to the effects of insulin over time, necessitating greater amounts of insulin be secreted by the pancreas in order to maintain blood sugar levels in an acceptable range. As a result of the pancreas working “overtime” to generate more insulin, the beta cells of the pancreas may eventually become “exhausted,” unable to produce the quantity of insulin necessary to regulate blood sugar levels. When this occurs, glucose in the bloodstream remains elevated after meals, unable to readily enter the tissues that require it. Chronically elevated blood glucose levels are a hallmark and indicator of diabetes.

Unlike type 1 diabetes, an autoimmune disease that prevents the pancreas from producing enough or any insulin, T2D develops as a result of several risk factors, some of which are modifiable. Non modifiable risk factors such as age, ethnicity, and family history/genetics contribute to T2D risk, but other factors such as early childhood nutrition, and lifestyle factors such as physical activity, smoking, sleep, mental health, exposure to environmental contaminants and, of course, diet can all be altered and can raise or lower the risk of developing T2D.

Role of Diet

Chronically high glycemic index/glycemic load diets, sugar sweetened beverages, red and processed meats, and highly processed and refined food intake are dietary factors that can increase diabetes risk. The term “chronically high” is important in

this regard; occasional or non-habitual use of high glycemic or processed foods does not constitute a threat. It is the excessive consumption of these products that may elevate risk.

Diets with nutritional profiles that include adequate magnesium, selenium, vitamin D, and omega-3 polyunsaturated fats, and that contain plant-based foods, nuts, fiber, coffee, and low-fat and fermented dairy foods like yogurt and kefir tend to lower diabetes risk. Dietary patterns such as the Dietary Approaches to Stop Hypertension (DASH) Eating Plan and the Mediterranean Diet, which both include dairy, are patterns that have been shown in numerous studies to lower the risk of developing T2D.

Role of the Dairy Matrix in Diabetes Prevention

Data from several meta-analyses of observational studies indicate a strong inverse relationship between total dairy intake and T2D. That is, the more dairy people tend to consume, the lower their risk of developing T2D.

When the fat content of dairy was factored in, the relationship between low fat dairy intake and a lower risk of T2D remained strong particularly for products like yogurt, which exhibit a protective effect. High fat dairy intake exhibited neutral effects overall; not as protective as lower fat products, but not promoting risk either. Overall, the impact of total dairy intake on T2D prevention is strong across multiple observational trials.

These observations are attributed in part to the unique matrix of dairy foods, which includes not only the nutrient content of dairy but also other components in dairy, their diverse physical structures that arise from various processing steps that dairy foods undergo during production, and how they interact to produce an effect on health. Several studies indicate that the combination of nutrients in dairy, including several dairy fatty acids, protein, vitamin K, calcium, and probiotics, can work in concert with processes like fermentation and homogenization to impact several compounds and signaling mechanisms in the body to lower diabetes risk. In fact, several fatty acids in dairy are positively associated with better insulin sensitivity, which can be key to preventing or treating T2D.

A Clinician's Perspective: How Nutrition Can be Used as Therapy to Treat Diabetes and Promote Remission

As a physician and researcher who has long studied the clinical effects of diet on diabetes prevention and treatment, Dr. Osama Hamdy indicated that poor nutrition is causal in the development of numerous disease conditions, particularly T2D.

Among other things, chronic consumption of high calorie, low nutrient-dense diets can increase both visceral and ectopic fat stores, which can have profound effects on pancreatic beta cell function. As fat cells become enlarged they can activate the immune system, which initiates a cascade of effects that may lead to insulin resistance, T2D, and undesirable cholesterol levels that may promote hypertension and cardiovascular disease (CVD), among other things.

Losing weight can improve several markers of disease/dysfunction in people with T2D and prediabetes and can lower CVD risk. In fact, as little as a 7% weight loss in T2D patients can improve insulin sensitivity by as much as 57%.

"High quality protein foods like dairy are key to treating type 2 diabetes"

Osama Hamdy, MD, PhD

Joslin Diabetes Center; Harvard Medical School
Boston MA

T2D is, to a large extent, a disease resulting from an overconsumption of refined carbohydrate-containing foods. Refined carbohydrate is the primarily nutritional trigger for insulin release; insulin in turn can promote lipogenesis (fat production in tissues) and a reactive hypoglycemia that can promote hunger and further carbohydrate consumption several hours later. Refined carbohydrate intake can set in motion a vicious cycle, particularly in sedentary or overweight individuals, that can lead to fat storage, low blood sugar levels, hunger, and further carbohydrate consumption. Over time this can contribute to obesity, insulin insensitivity, and increase risk for T2D and CVD.

The antidote? According to Dr. Hamdy, a lower carbohydrate diet that contains less red and processed meats, little or no sugar sweetened beverages, and

small amounts of high glycemic foods like whole grain rice and some pastas, coupled with greater intakes of high-quality protein foods like dairy is best for treating or preventing T2D. Data indicate frequent dairy consumption (up to ~20 servings per week) was associated with the greatest weight loss in subjects with T2D in clinical trials, as well as American Diabetes Association recommendations indicating that reduced carbohydrate diets are best for improving glycemia and lowering T2D risk.

Finally, there is the issue of weight loss quality versus quantity; that is, the absolute number of pounds lost through diet and lifestyle modification (weight loss quantity) compared to the amount of lean mass versus fat mass lost via weight loss (weight loss quality). Diabetes can accelerate the loss of lean muscle mass, but higher protein diets that include dairy, coupled with physical activity and other behavioral changes, can aid in the maintenance of lean mass during weight loss in diabetic subjects. Medical nutrition therapy, which includes dairy foods, is fundamental to diabetes management.

DAIRY LEADERSHIP: A CALL TO ACTION.

The dairy sector should continue to support outreach on the beneficial effects of dairy on T2D prevention and treatment.

Research investment into the unique effects of the dairy matrix on T2D is prudent at this time.

For more information on the Global Dairy Platform's Perspective Papers or our Quarterly Webinar Series, please reach out to Dr. Beth Bradley at beth.bradley@globaldairyplatform.com.