Foreword

Introduction to the Second Global Summit on the Health Effects of Yogurt

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The purpose of the Second Global Summit on the Health Effects of Yogurt was to review and evaluate the strength of current scientific knowledge regarding the health benefits of yogurt. To begin, the historical and current patterns of yogurt consumption were reviewed. Then, the evidence base for the benefits of yogurt for maintaining health throughout the life cycle, including optimal body composition, and for reducing the incidence of chronic diseases such as obesity, type 2 diabetes mellitus, and cardiovascular disease was presented. Speakers also discussed the emerging evidence for a link between gut microbiota and health, with a focus on the gut–brain axis and early programming. To conclude, the role of dairy products in a sustainable diet was presented, taking into account both nutritional and environmental factors.

On 30 April 2014, the Second Global Summit on the Health Effects of Yogurt was held as a satellite symposium to the 2014 Experimental Biology meeting. The symposium followed the successful First Global Summit that was held in Boston, Mass., in April 2013, organized by the Yogurt in Nutrition Initiative, which was established in 2012. As stated in the proceedings of that meeting, "the overall mission of the Yogurt in Nutrition Initiative is to advance scientific knowledge on the health benefits of yogurt and to broadly disseminate that information."[1] Indeed, the first and second global summits were constructed to identify and review the existing science on the health benefits of yogurt and to disseminate this knowledge.

At the 2014 summit, Dr. Fisberg[2] reviewed the history of yogurt and reminded the audience that yogurt has been a part of the human diet for thousands of years and was consumed by a diverse group of nations and ethnic groups. Yogurt consumption appeared in Turkish literature in the 11th century. In fact, Genghis Khan, the founder of the Mongol Empire, fed his army yogurt, a staple of the Mongolian diet, based on the belief that it instilled bravery in his warriors. Although yogurt has been a part of the diet of many cultures around the globe, it was not until the early 20th century that the bacteria used for milk fermentation were characterized. This led to the large-scale commercial production of yogurt and its increased availability and popularity. In recent years, the research base that supports the health benefits of yogurt has been building and includes clinical and epidemiological evidence, as well as mechanistic underpinnings.

Dr. Moreno took the audience back to childhood, where the origin of many noncommunicable diseases can be found.[3] A reminder was offered that obesity in children, as in adults, can result in hypertension, dyslipidemia, chronic inflammation, and hyperinsulinemia and that type 2 diabetes prevalence is rapidly growing in the pediatric population. The question then arose: Can dairy product consumption reduce this risk? After the available evidence in the literature was reviewed, it was concluded that "despite concerns that energy provided by dairy products may contribute to childhood obesity, the evidence overwhelmingly supports a null or inverse association between milk or dairy product intake and indicators of adiposity."[3] The results of the Healthy Lifestyle in Europe by Nutrition in Adolescence study, were also reported; this was a study that investigated the relationship between dairy consumption and cardiovascular disease risk factors in adolescents (age range, 12.5–17.5 years) in Europe. This study showed that, overall, dairy intake was the factor

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that best identified adolescents at low risk of cardiovascular disease. Higher consumption of milk and yogurt, as well as of milk- and yogurt-based beverages, was associated with lower body fat and higher cardiorespiratory fitness.

The results of the Healthy Lifestyle in Europe by Nutrition in Adolescence study were reinforced by the results of the European Prospective Investigation into Cancer (EPIC) study, as discussed by Dr. Forouhi.[4] The EPIC InterAct study showed that certain dairy products, particularly fermented dairy products including yogurt, may be relevant for the prevention of type 2 diabetes. Specifically, there was no significant association with total dairy product intake, or milk intake, but a higher combined intake of fermented dairy products (cheese, yogurt, and thick fermented milk) was inversely associated with diabetes. The EPIC InterAct study was followed by the EPIC–Norfolk study that assessed dietary dairy product intake using a real-time, 7-day food diary.[5] In that prospective study, "higher consumption of low-fat fermented dairy products was associated with a lower risk of new-onset diabetes over 11 years, compared with non-consumption."[5] The effect was mainly due to low-fat fermented dairy products, primarily yogurt. Forouhi concluded from the findings of the EPIC study (EPIC–InterAct and EPIC–Norfolk) that a focus on nutrients such as saturated fats may be wrong and that the focus should be on food items rather than specific components of these food items. The best example is meat and dairy products, as both groups are rich in total fat and saturated fat but have opposite associations with type 2 diabetes. Furthermore, the findings of the EPIC study suggest it is better to consider food-group subtypes (e.g., fermented dairy products), rather than overall food-group categories (e.g., dairy products), for their role in the prevention of chronic diseases.

Dr. Tremblay reviewed the impact of yogurt on appetite control, energy balance, and body composition.[6] His presentation highlighted the available literature that demonstrates the positive effect of yogurt consumption on weight control and weight reduction. Although this phenomenon can be explained by the substitution of yogurt for high-energy, "less healthy" foods, other explanations exist, including the demonstration that yogurt consumption is associated with effects on hunger, desire to eat, and enhanced feelings of fullness. In their literature review of the topic, Tremblay et al.[6] discuss the possibility that the high calcium and high protein contents of yogurt are responsible for yogurt's effect on weight reduction, as well as the demonstrated positive effect of milk and yogurt on levels of the appetite-reducing hormones GLP 1 and PYY in blood. The authors discuss the possibility that the matrix of yogurt or its viscosity may influence satiety, as well as the possible effects of the influence of yogurt on gut microbiota as a mediator of changes in lean and fat body mass.[6]

Dr. Bienenstock discussed the role of the intestinal microbiota on health.[7] Not only does the intestinal microbiota outnumber the amount of cells in the human body, it also affects organs remote from the intestine. In addition, there is a growing body of evidence from animal studies that supports the effect of the intestinal microbiota on the central nervous system, including effects on emotional behavior. Thus, changes in diet modulate the gut microbiota and, thus, induce changes in behavior. These effects could be mediated by changes in neurotransmitters, such as gamma amino butyric acid and in short-chain fatty acids via regulation of the immune response and induction of changes in central nervous system function. The findings from animal models are supported by evidence in humans that show possible associations between intestinal dysbiosis and psychiatric disorders, including the effect of supplementation with probiotic bacteria on anxiety. The effect of consumption of fermented milk products on activity in the brain regions that control central processing of emotion and sensation have been documented by using functional magnetic resonance imaging both before and after consumption.[8]

The importance of the gut microbiota was revisited by Dr. Goulet,[9] who reviewed the evidence that microorganisms are present in the human intestine immediately after birth and that the composition and diversity of the intestinal microbiota are influenced by infant diet. Early differences in the microbial taxa may have long-term effects on human health. Some evidence supports the concept that "metabolic programming" of obesity, allergies, and autoimmune disorders during the fetal, perinatal, and postnatal origins may well be explained by "microbial programming." Thus, it is attractive to hypothesize that active modulation of the intestinal microbiota using certain strains or modifiers of intestinal microbiota such as probiotics or yogurt may prevent or treat various diseases including irritable bowel syndrome, acute gastroenteritis, and necrotizing enterocolitis, as well as obesity, allergy, and autoimmune disorders.

Dr. Wolfe brought the discussion back to the importance of proteins in the context of the natural process of loss of lean body mass that occurs with aging (sarcopenia) and the central role of lean body mass loss in the development of many adverse health issues in the elderly.[10] Increased dietary protein intake can explain increased muscle strength and physical function, improved cardiovascular and bone health, and better weight management, which, in turn, affect long-term health outcomes. The current recommended dietary

allowance of 0.8 g protein/kg/day, as well as the average intake in the United States, which is currently about 1.2 g protein/kg/day, are below the amount recommended by expert committees of the National Academy of Sciences and the US Department of Agriculture, i.e., 46 g/day for women and 56 g/day for men. However, setting quantities of protein intake alone disregards the importance of the protein's quality. Thus, ranking proteins by their quality becomes an important issue in dietary requirements. This can be done using the "protein digestibility corrected amino acid score," which is a score that is based on the amino acid profile and the relative amounts of essential amino acids in the protein, or the more recent "digestible indispensable amino acid score," which replaces the protein digestibility corrected amino acid score and is based on the relative digestible content of the essential amino acids and the amino acid requirement pattern. Overall, protein intakes that are higher than the recommended dietary allowance promote better health outcomes in the elderly by positively affecting a wide range of body systems. Use of high-quality proteins such as milk proteins enables the elderly to achieve essential amino acid requirements with lower caloric intake, as reflected by the high-quality score of milk proteins.[10]

The final presentation was dedicated to yogurt and sustainability. Dr. van Hooijdonk[11] discussed the growing demand for dairy products, especially in emerging markets, and the major impact of dairy product consumption on the daily intake of nutrients. While milk production and processing both contribute to greenhouse gas emissions, the authors discussed the need to evaluate foods, dairy products included, from both nutritional and environmental perspectives. Such evaluations should be coupled with a shift from comparing food products in isolation to evaluating complete diets.

In summary, the presentations at the Second Global Summit on the Health Effects of Yogurt demonstrated that ongoing research continues to broaden understanding of the effects of yogurt on health and should provide stimulus for further research in this field.

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