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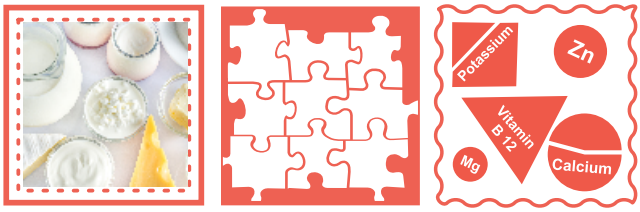
On Nov 9 2022, the Consumer Education Project of Milk South Africa hosted a webinar to unpack the science behind the food matrix as it applies to dairy and to explain how it affects overall health and, in particular, cardiovascular risk. ??? Text

A publication for health professionals

The dairy matrix explained:

Health benefits beyond the individual nutrients



The concept of the food matrix suggests that a food's nutritional and health effects are due to its structure and nutrient composition and, in turn, their interaction. Aguilera has described the food matrix as 'the physical domain that interacts with specific constituents of food.'[1] Food is thus more than the sum of its nutrients. The characteristics of the food structure and the nutrients in it (i.e., the food matrix) will impact how the nutrients are digested and absorbed, changing their metabolic and health effects.[2]

As nutrition science advances, it is becoming more and more evident that the food matrix effect plays a significant role in the impact that food has on health. As a result, we need to reconsider how the health consequences of food beyond the specific nutrients they contain are assessed.[3] One of the most thoroughly studied examples of the 'food matrix effect' is the dairy matrix, which has been shown to have beneficial influences on several metabolic outcomes and systems and on overall health.[2]

On Nov 9 2022, the Consumer Education Project of Milk South Africa hosted a webinar to unpack the science behind the food matrix as it applies to dairy and to explain how it affects overall health and, in particular, cardiovascular risk. The attendees were privileged to listen to presentations by two experts in the field - Prof Arne Astrup of the Novo Nordisk Foundation in Denmark and Prof Renée Blaauw of the Human Nutrition Division at the University of Stellenbosch.

In his presentation titled 'Saturated fat and cardiovascular disease (CVD): a need for revision of current recommendations?', Prof Astrup highlighted that recent scientific evidence does not support the current guidelines to reduce the intake of saturated fat to reduce CVD risk.[4] These guidelines include the US Dietary Guideline to restrict saturated fatty acid (SFA) intake to less than ten percent of energy intake and the European Food Safety Authority recommendation to reduce SFA intake as much as possible. He noted that there is insufficient evidence to recommend reducing saturated fat consumption to prevent CVD or lower mortality.[5] To demonstrate this, he referred to the findings of a meta-analysis of observational research and randomised controlled trials[6] that contradict this recommendation. He explained that individual SFAs have very different biological effects, and their link to CVD is unclear.[7]

Prof Astrup emphasised that the health effects of nutrients are modified by the food matrix and the carbohydrate content of the diet.[4] Nutrition scientists realise that the historically preferred single-component approach needs to be replaced with a more holistic understanding of the synergistic effect of the constituent nutrients in whole foods, which he referred to as 'the magic of food.'

Numerous foods that are relatively high in SFAs, like whole-fat dairy, dark chocolate, and unprocessed meat, do not increase the risk of diabetes or CVD.[4,5] Additionally, fermented dairy products like cheese and yoghurt appear to be protective against CVD.[8]

Many clinicians are concerned about the potential of saturated fat to increase low-density lipoprotein (LDL)-cholesterol. However, while eating a diet high in saturated fat may raise LDL cholesterol, it does so because of the large, more inert LDL particles, while the smaller, more atherogenic particles are reduced.[9] To clinically track the effects of dietary modifications on CVD risk, Prof. Astrup proposed the need for innovative measurements. He commented that 'focusing only on saturated fat as the culprit driving cardiovascular disease is outdated'

Given the above, foods like cheese, yoghurt, whole eggs, dark chocolate, and unprocessed meat can easily be incorporated into diets that prevent CVD, obesity, and osteoporotic fractures.[5] Instead, emphasis should be placed on decreasing the intake of sugars and refined starchy foods and increasing the consumption of whole foods high in fibre and wholegrains.[10]

Finally, Prof Astrup emphasised the importance of considering additional effects of dairy consumption on health, such as those on obesity and weight management. Dairy consumption improves body composition in adults participating in weight loss programmes and lowers the risk of weight gain and obesity in children.[11] The benefits of dairy should be considered in attempts to prevent and control obesity since overweight and obesity are currently the main risk factors for type 2 diabetes, CVD, and some cancers.[12] These benefits are independent of dairy's saturated fat content and seem to be closely linked to the dairy matrix effect.[12]

In her presentation titled 'Not all fats are the same, with special reference to dairy and cardiovascular disease', Prof Blaauw highlighted the non-communicable disease burden in South Africa and pointed out that lifestyle-related factors including obesity, inactivity, and smoking contribute to the risk for CVD. She stated that all cardiometabolic risk factors should be addressed in interventions for the prevention and treatment of CVD, with a focus on lowering LDL cholesterol and blood pressure. Prof Blaauw reiterated Prof Astrup's statement that the current recommendations to limit the dietary intake of SFA's to less than ten percent of total energy intake are being challenged for not being evidence-based. As dairy fat contains up to sixty percent SFA's, these guidelines recommend low-fat dairy to reduce saturated fat intake. More recent studies have shown that this is not necessary.[13]

Intervention studies have suggested that the metabolic effects of total dairy may differ from those of a single dairy ingredient.[2] Prof. Blaauw elaborated on research that has produced conflicting findings about the impact of dairy consumption on CVD risk, noting some of the variables that may have influenced the results of these studies. Among them are the individual dairy product (cheese, yogurt, milk), the dose-response effect (amount of dairy consumed), the degree of food processing (e.g. pasteurisation and fermentation), the presence of bioactive compounds and probiotics that impact on the gut microbiome and inflammation, and the synergistic impact of the dairy food matrix.[13]

She discussed dairy fat and elaborated on why all fats are different, emphasising that there is no convinscientific evidence that eating dairy increases the risk of CVD, stroke, or inflammation[4] and reaffirmed that fermented dairy products may actually have a preventive effect on CVD.[8] These effects are probably caused by the unique composition of the fat found in dairy products and the complementary effects of its various nutrients, or the food matrix effect.

The currently available research suggests that the type and source of dairy have a greater impact on CVD risk than the overall amount consumed or a particular nutrient in dairy. Total dairy consumption of up to 200g per day, regardless of fat level, is not linked to negative consequences in healthy people.[13] Additionally, the consumption of fermented foods should be emphasised since processing methods such as fermentation may augment interactions between nutrients in the dairy matrix, which may positively influence the effects of dairy consumption on metabolic markers.[2]

To prevent non-communicable illnesses, a food-based dietary approach that considers the impact of the diet as a whole on health rather than concentrating primarily on the impact of specific nutrients is advised. She concluded: 'We have to look at the big picture to understand the health effects of food. When it comes to dairy intake, evidence shows that the focus on low-fat products simply does not hold.'

Both presentations by Prof Astrup and Prof Blaauw provided convincing evidence that the focus on low-fat or fat-free dairy in dietary recommendations should be reconsidered. Nutrients in food interact with one another, and the combined effects are more robust than those of individual nutrients. In recent years, the focus of nutrition science has thus shifted from nutrients to whole foods - because foods are eaten as a whole and together with others.[3] Consequently, dietary guidelines have also moved away from nutrientbased approaches to advocating food-based dietary patterns that focus on the adequate intake of specific foods for health rather than the intake of nutrients to prevent deficiencies. A large body of scientific evidence supports milk and dairy products' essential role in a healthy eating pattern.

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