

# The role of dairy consumption in preventing type 2 diabetes

The proportion of individuals with type 2 diabetes is increasing worldwide. The estimated prevalence of 2.8% in 2000 is expected to increase to an alarming 7.7% in 2030. Between 2010 and 2030, there will be a 69% increase in the number of adults with diabetes in developing countries and a 20% increase in developed countries.<sup>1</sup> In South Africa, up to 1.5 million people are affected, resulting in this disease to be the eighth leading cause of death.<sup>2</sup> Preventative efforts to modify risk factors for type 2 diabetes are paramount to abate this epidemic. Specific nutrients, foods or dietary patterns are emerging as important factors in the prevention and management of insulin resistance and type 2 diabetes. Among such potentially protective measures, several studies have shown that a high dairy intake can lower the risk of type 2 diabetes.<sup>3,4,5,6</sup>

## High intake of dairy products lowers the risk of type 2 diabetes

A number of studies suggest that the beneficial effect of dairy in the prevention of type 2 diabetes is twofold. Firstly, dairy intake may affect the precursors of disease, i.e. body weight, hypertension and glucose homeostasis.<sup>6,7</sup> Secondly, results of meta-analyses of published evidence<sup>8</sup> support an overall survival advantage from the consumption of milk and dairy foods with regard to a reduction in type 2 diabetes. This could possibly be related to specific components of dairy, such as the type and amount of fat in dairy, as well as the quantity and frequency of dairy consumption.<sup>3,4,5,6,8</sup>

A high intake of dairy products, defined as an average of three servings per day, was shown to lower the relative risk of developing type 2 diabetes by 14%.<sup>3</sup> A separate dose-response analysis indicated that with each additional serving of dairy food consumed per day the risk of type 2 diabetes is lowered by an additional 6%.<sup>3</sup>

Consumption of low-fat dairy products is implicated in lowering the risk of type 2 diabetes even further, as observed in both men and women.<sup>3,6,9,10</sup>

A recent prospective cohort study performed on postmenopausal women, a population with a high risk of type 2 diabetes, substantiate that low-fat dairy and yoghurt consumption is associated with a lower type 2 diabetes risk. This inverse relationship is more pronounced in women with a higher BMI.<sup>11</sup>

## Teenage dairy intake reduces the risk of type 2 diabetes in adulthood

There are indications that the risk of developing type 2 diabetes depends on early life exposures, such as maternal diet during pregnancy, post-natal growth, and childhood and adolescent

diet. This is substantiated by evidence showing that a high intake of dairy during adolescence is associated with a markedly decreased risk (-38%) of type 2 diabetes in adulthood.<sup>5</sup> Sustained consumption of dairy appears to be particularly important as further reduced risk was observed in women who continued dairy consumption into their adult years.<sup>5</sup>

## Nutrient composition of milk is linked to the prevention of type 2 diabetes

Several components of dairy play a role in the reduction of type 2 diabetes. These include calcium, magnesium, lactose and dairy protein, which may promote weight loss and reduce blood pressure.<sup>4,6</sup>

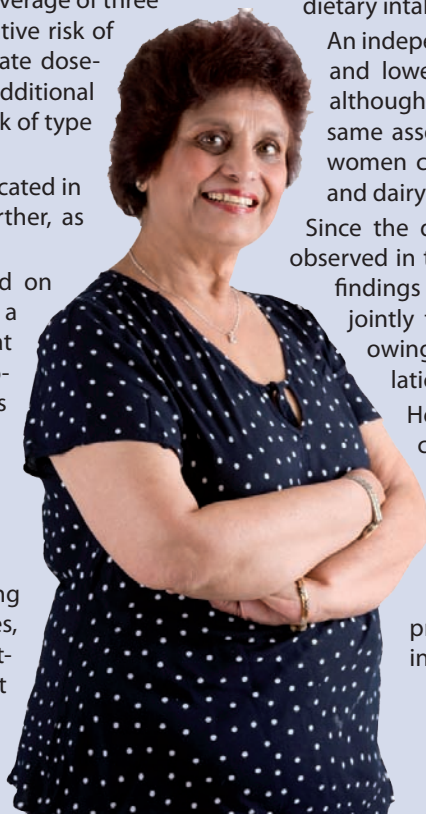
Positive and independent associations of magnesium and calcium intake with insulin sensitivity have been identified.<sup>7,12</sup> Increased dietary magnesium intake confers protection against the incidence of diabetes, metabolic syndrome, hypertension and cardiovascular disease. It ameliorates insulin resistance and serum lipid profiles and lowers oxidative stress.<sup>13,14</sup> The recommended three servings low-fat or fat-free milk per day provide 900 mg calcium and 80 mg magnesium. Studies show that for every 100 mg increase in magnesium, up to the recommended dietary intake, the risk of developing type 2 diabetes is reduced by 15%.<sup>13</sup>

Calcium and vitamin D\* have been shown to improve pancreatic beta cell function and peripheral insulin sensitivity.<sup>7</sup> A study by Kirii *et al.*<sup>12</sup> demonstrated a clear decreasing trend of type 2 diabetes risk in both men and women who had an increased dietary intake of calcium and vitamin D.

An independent association between dairy food intake and lowered risk of type 2 diabetes was observed, although only in the women. It is possible that the same association was not found in men because the women consumed much larger quantities of calcium and dairy products than the men.

Since the decreasing risk of type 2 diabetes was not observed in the group with a lower vitamin D intake, the findings suggest that calcium and vitamin D may act jointly to protect against type 2 diabetes, possibly owing to both playing a role in insulin regulation.<sup>12</sup>

Health benefits currently associated with increased dairy intake may also be attributed to the whey component of dairy proteins. The protein component may enhance satiety and reduce the risk of overweight, high blood pressure and obesity, which are major risk factors for type 2 diabetes. Whey protein was further observed to enhance insulin sensitivity.<sup>16</sup>





The protective effect of dairy is not limited to its micronutrient composition. New research suggests that a fatty acid found in dairy may directly protect against insulin resistance and diabetes.<sup>17</sup> Trans-palmitoleate is a largely unstudied fatty acid produced by ruminant stomach bacteria and is consumed by humans in the form of dairy and meat. Consumption of regular-fat dairy foods had the strongest association with circulating trans-palmitoleate levels, which, in turn, was associated with a substantially lower onset of diabetes.<sup>17</sup>

## Conclusion

Although heredity may play a significant role in the presentation of type 2 diabetes, lifestyle choices and health behaviours can also affect the development and progression of the disease. An adequate intake of a variety of foods that are high in elements known to influence the outcome of disease, such as dairy products, may significantly reduce the risk of type 2 diabetes.

\* South African milk products are not enriched with Vitamin D, due to the supposition that the population is exposed to adequate amounts of sun light.

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