



Saturated fatty acids in dairy: *Beware of oversimplification*

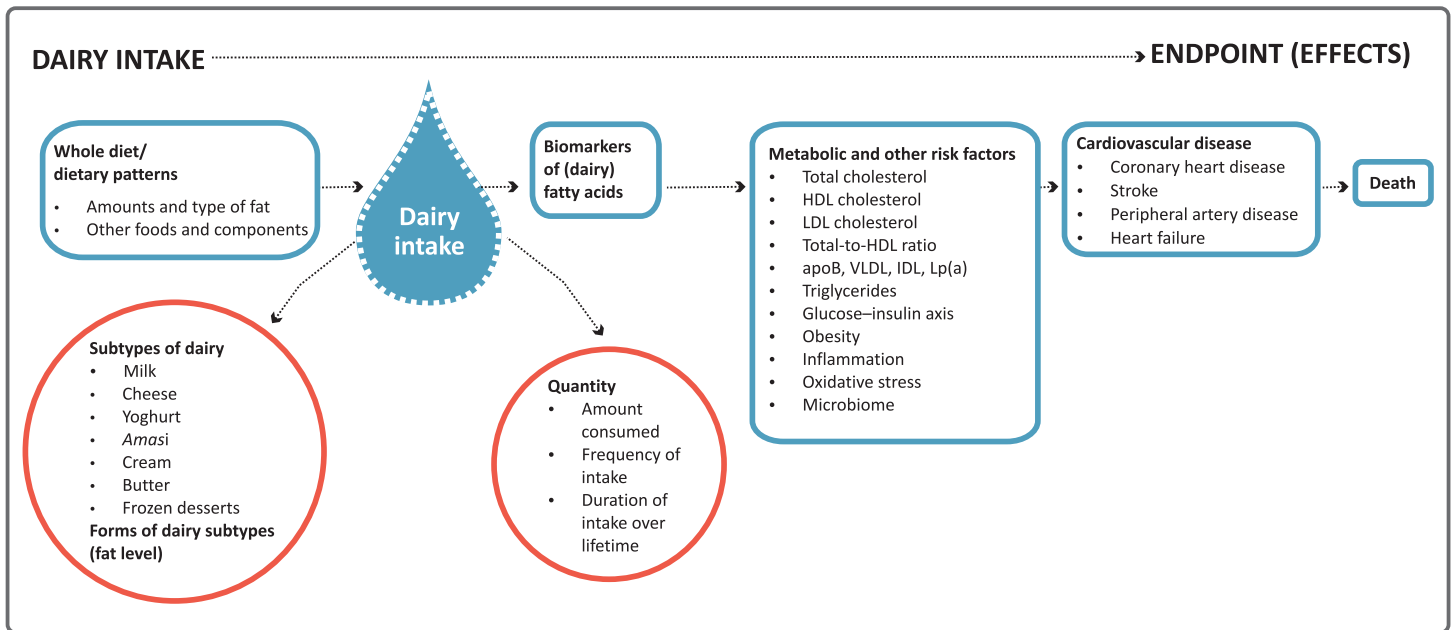


Figure 1
The intricate link between dietary dairy intake and cardiovascular disease

Dairy is a pillar of a healthy diet and provides many essential nutrients. In response to the saturated fatty acids (SFA) : cholesterol hypothesis, many well-designed, recent large studies found either a protective or a null effect between dairy intake and heart disease.^{1,2}

The current knowledge base with regard to the relationship between dairy intake and heart health shows the following:

- The composition of dairy products differ and different products have different effects.
- The various SFAs do not all have the same effects.
- Fatty acids in a dairy matrix may have different metabolic effects compared with isolated fatty acids.
- The dietary risk associated with SFA intake depends on the type and amount of other nutrients being replaced.
- Cardiovascular disease is a group of conditions, with different risk profiles. A proposed link between dietary intake of SFAs and a higher risk of disease does not necessarily translate to cardiovascular disease or death.

Introduction

Many South Africans' diets are high in fat and SFAs, which may prompt consumers to exclude dairy from their diet in pursuit of lower-fat choices. Dairy intake is further compromised by the perception that regular consumption of these products is related to cardiovascular disease, particularly owing to their SFA content. However, the reality is that dairy is a group of products, each composed of an array of fatty acids, nutrients and non-nutrients combined in a complex matrix. These affect lipoprotein metabolism differentially,^{3,4} which makes the link between dairy intake and cardiovascular disease an intricate one (Figure 1).

Different saturated fatty acids, different effects

Among the lipoproteins implicated in cardiovascular disease, low-density lipoprotein (LDL) cholesterol and the dietary fatty acids affecting it are of primary interest.⁵ The SFAs that have attracted the most attention are stearic, palmitic, myristic and lauric acid. As shown in Table 1, these SFAs have differential effects on serum lipid profiles. In general, stearic acid has a non-significant decreasing effect on the ratio between total and high-density lipoprotein (HDL) cholesterol, whereas intake of myristic and palmitic acid non-significantly affects this ratio. In contrast, lauric acid decreases the ratio of total to HDL cholesterol.⁶ As SFAs have a variety of functions, they should not be considered a single group.⁷

Table 1Effect of individual SFA on lipid* profiles⁶ and contribution of these fatty acids to total SFA content of milk⁷

SFA	Total cholesterol	LDL-C	HDL-C	Triglycerides	Total-to-HDL cholesterol ratio	Milk	
						Fresh full-cream (g/100 ml)	Fresh low-fat (g/100 ml)
Stearic (18 : 0)	Neutral	Neutral	Neutral	↓	Neutral	0.4 (21%)	0.28 (22%)
Palmitic (16 : 0)	↑	↑	Neutral	↓	Neutral	0.8 (42%)	0.59 (41%)
Myristic (14 : 0)	↑ ↑	↑	Neutral	↓	Neutral	0.3 (16%)	0.21 (16%)
Lauric (12 : 0)	↑ ↑	↑	↑	↓	↓	0.09 (5%)	0.07 (5%)

* Isoenergetic replacement of fresh full-cream milk is 1.93 g and of low-fat 1.30 g per 100 ml. Dairy products contribute relatively little to the SFA composition of the diet compared with other products of animal origin.

The total SFA content of fresh full-cream milk and low-fat milk is 1.93 g/100 mL and 1.30 g/100 mL, respectively. Depending on the amount consumed, dairy products contribute relatively little to the SFA content of the diet compared with other animal-derived foods. Apart from the total SFA content of dairy, the origin of the specific SFAs (i.e. the dairy subtype) may also come into play. For example, SFAs from cheese and butter were shown to have similar effects on HDL cholesterol levels, but different effects on LDL cholesterol.^{8,9}

Dairy product consumption and cardiovascular health

Figure 1 shows that the strength of the association between dairy consumption and cardiovascular disease depends on many intermediary factors between dietary intake and the endpoint. The following points illustrate why current evidence challenges the traditional, oversimplified theory regarding the effect of dairy intake on cardiovascular health.

- In studies on the effect of SFAs on cardiovascular disease, the nutrient used to replace the SFAs (to ensure the same energy intake in experimental groups) may affect the conclusion.^{6,10} Carbohydrates, polyunsaturated fatty acids, monounsaturated fatty acids, proteins, plant-derived foods or combinations of these used to replace SFAs may all yield different answers. Furthermore, the percentage of SFAs that is substituted is of importance.¹¹ For example, a 1% substitution of the energy from carbohydrates was applied in the study from which Table 1 is derived. A systematic review in this regard concluded that reducing the SFA content of the diet by replacing it with carbohydrates of an equivalent energy value would not lower coronary heart disease or mortality, whereas substituting with poly- or monounsaturated fatty acids would.¹² (However, this has been questioned in the case of *n-6* polyunsaturated fatty acids.¹³) It follows that the effects of reducing the intake of SFAs in the diet depend on what they are replaced with. In the case of dairy-derived SFAs there may be attenuating factors, such as the effect of other dairy matrix components on blood lipids.¹⁴

Cardiovascular disease is associated with multiple risk factors and encompasses many conditions.

Dairy products may be differentially related to the risk factors (e.g. obesity, inflammation,¹⁵ serum lipids, blood pressure) and the various diseases (e.g. coronary heart disease, stroke,^{16,17} etc.). A systematic review² revealed favourable associations between (i) intake of total dairy, low-fat dairy, cheese and fermented dairy and the risk of stroke; (ii) low-fat dairy and milk consumption and the risk of hypertension; (iii) total dairy and milk intake and the risk of metabolic syndrome, and (iv) total dairy and cheese consumption and type 2 diabetes. Intake of regular-fat dairy products was found not to be associated with an increased risk of cardiovascular disease and inversely related to weight gain, an independent risk factor of cardiovascular disease.⁴ Similarly, long-term exposure (22 years) to three biomarkers of dairy fat was not significantly related to either total mortality or cardiovascular disease in older adults. One of the markers was, in fact, favourably associated with cardiovascular disease and death due to stroke.¹⁸

- Dairy products are associated with a favourable effect on cardiovascular disease risk factors not related to blood lipid profile, such as blood pressure, inflammation, insulin resistance and type 2 diabetes, obesity and metabolic syndrome.

From the old hypothesis to a new view

The longstanding simplified view of the link between cholesterol and heart health is widely questioned. As such, the World Health Organization is currently updating international guidelines on dietary intakes of SFAs and trans-fatty acids for preventing cardiovascular disease in line with current evidence. The extrapolation of recent findings to contemporary recommendations is a challenging task, especially in light of an integrative review of prospective cohort studies, systematic reviews and meta-analyses published between 2014 and 2017 pointing to contradictory results.¹⁹ However, current evidence confirms that single-nutrient interventions (e.g. focusing only on SFAs) are not a solution. Adopting a whole-diet and lifestyle approach, which includes dairy, is needed for heart health.

Conclusion

Recent literature shows no conclusive evidence that milk or dairy as a food group is associated with an increased risk for cardiovascular disease. Dairy products in general, as well as their specific components, have furthermore been shown to have a favourable effect on nonlipid cardiovascular disease risk factors. These findings suggest cardiovascular benefits of dairy foods that go beyond blood lipids. Milk and other dairy products can therefore be eaten every day, as recommended by the South African food-based dietary guidelines, without the fear of an increased risk of cardiovascular disease and may even confer a cardioprotective effect.

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