Cardiovascular diseases (CVDs) are the leading causes of death worldwide. Type 2 diabetes (T2D) is on the rise and is associated with a higher risk of developing CVD making these two conditions highly associated. Risk markers such as increased low density lipoprotein cholesterol (LDL-C), low high density lipoprotein cholesterol (HDL-C), high fasting and postprandial triacylglycerol (TAG), obesity, increased blood pressure, fasting blood glucose and waist circumference, smoking and a sedentary lifestyle all contribute to an increased risk of CVD and T2D. Dairy fat contains high amounts of saturated fatty acids (SFAs) which are known to increase LDL-C in the blood. Consequently, dietary guidelines recommend low-fat dairy products. However, these recommendations are not in agreement with results of meta-analysis of observational studies that find no association between dairy intake and a higher risk of CVD and even point to an inverse association with T2D. In general, there seems to be a knowledge gap when it comes to randomized controlled trials (RCT) on the effect of specific dairy products and risk markers of CVD and T2D. Therefore, dietary guidelines today are primarily based on expected effects of macronutrients such as SFAs and on that basis exclude or leave very little room for regular/high fat dairy products such as butter, whole milk and semi-skimmed milk. Therefore, the overall aim of this PhD thesis was to investigate the effect of dairy products given as whole foods on risk markers of CVD and T2D through three intervention studies.

The objective of study I was to investigate the effect of a moderate butter intake (4.5 E%) in a normal diet on fasting concentrations of blood lipids (total cholesterol (TC), LDL-C, HDL-C and TAG) and secondarily on insulin and glucose and high-sensitivity C-reactive protein in healthy adults. The effect of butter was compared with refined olive oil (without polyphenols) and the habitual diet of the participants in a 2x5-week crossover study with two weeks run-in of habitual diet. A total of 47 of the 50 recruited subjects completed the intervention. We found that a moderate butter intake increased TC and LDL-C significantly compared with olive oil and the habitual diet. In addition the butter diet also increased HDL-C compared to the habitual diet leaving the ratio total/HDL-C unchanged.

The objective of study II was to investigate the effect of a daily intake of 0.5 L whole milk compared with skimmed milk on fasting concentrations of blood lipids (TC, LDL-C, HDL-C and TAG) and secondarily on insulin and glucose in healthy adults in a 2x3-week crossover intervention
study. A total of 17 of the 18 recruited subjects completed the intervention. We found no adverse effect on blood lipids compared to skimmed milk despite of a significantly higher SFAs content with whole milk. In addition, HDL-C concentration was significantly higher with whole milk compared with skimmed milk and correlated inversely with glucose concentration.

The objective of study III was to investigate the effect of a high intake of semi-skimmed milk (1L/d) for 6 months compared with sugar-sweetened soft drink (SSSD), non-caloric soft drink (NCSD) and water on insulin sensitivity evaluated by oral glucose tolerance tests and free fatty acids in overweight and obese adults. Secondarily, the effects on concentration of plasminogen activator inhibitor-1 (PAI-1), fasting blood lipids and BP were measured. A total of 60 of the 73 recruited subjects completed the intervention. We found no difference between the beverages on risk markers of T2D. Additionally, the milk intake did not change the concentration of blood lipids, blood pressure or PAI-1 compared with the other beverages. Only SSSD significantly increased concentrations of TC compared with NCSD and TAG compared with NCSD and water.

Based on three RCTs this thesis examined the effect of dairy products given as whole foods on risk markers of CVD and T2D. The results of study I support the current dietary guidelines that advice populations to prioritize intake of PUFA-rich oils such as olive oil or rapeseed oil in preference to butter in the prevention of CVD. Still, taking the HDL-C-raising effect into consideration we suggest that a healthy diet may leave room for a moderate butter intake in the normocholesterolemic population. Further, the results of study II are not in agreement with the current dietary guidelines when considering recommendations of choosing low-fat milk (≤ 0.5 % fat) to a healthy normal weight population. Finally, the results of study III suggests a neutral effect of milk consumption on risk markers of T2D and CVD. In summary, despite of belonging to the category of high-fat dairy products, the results suggest, that intake of semi-skimmed milk and whole milk were neutral or maybe even beneficial, respectively, in effect on blood lipids. Thus, the results also indicate that if the higher energy content is taken into consideration whole milk and semi-skimmed milk can be included in a healthy diet just as well as skimmed milk.