

Can milk help protect against obesity?

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Introduction

Dairy foods contain a large amount of long-chain saturated fat, and intake of these has traditionally been linked to increased risk of cardiovascular diseases. Furthermore, intake of whole milk and other dairy products with high fat content has been excluded from adult's diet due to risk of obesity. However, there are indications that milk may be able to lower the uptake of fatty acids and therefore milk fat may have the completely reverse effect. Increased levels of ANGPTL4 in circulation have been shown to inhibit the active form of lipoprotein lipase and thereby reduce lipid uptake in target organs, which may have a positive impact in relation to reducing obesity.

Aim

To identify the ANGPTL4-inducing compound in milk.

Methods

Free fatty acids (FFA) in milk were quantified by the ECF-FFA method, and milk's potential as regulator of ANGPTL4 was investigated *in vitro* using a human colon cell line. RT-qPCR was applied to measure ANGPTL4 mRNA abundance. Activation of PPAR and RXR was analyzed using a luciferase reporter assay.

Results

Milk up-regulated the ANGPTL4 gene expression, and we located the up-regulating compounds to be a wide range of FFAs from the milk fat. Milk with high levels of FFA had a higher up-regulating effect on expression of the ANGPTL4 gene than the milk with low levels of FFA. The combination of FFA in milk had a higher effect on ANGPTL4 compared to single fatty acids and the underlying regulatory mechanism was investigated. Milk with higher levels of FFA increased the transactivation of the three PPARs in a dose-dependent manner, but the activation of PPAR δ was 10 fold higher than of the PPAR α and PPAR γ .

Conclusion

The FFA in milk up-regulates the ANGPTL4 gene through the PPAR pathway. The specific combination of fatty acids in milk fat seems to be important for the up-regulation of ANGPTL4. This might help reduce the fat uptake in the tissue when milk products are included in the diet.