

Milk has Potential as Regulator of the Fasting-Induced-Adipose-Factor (FIAF)

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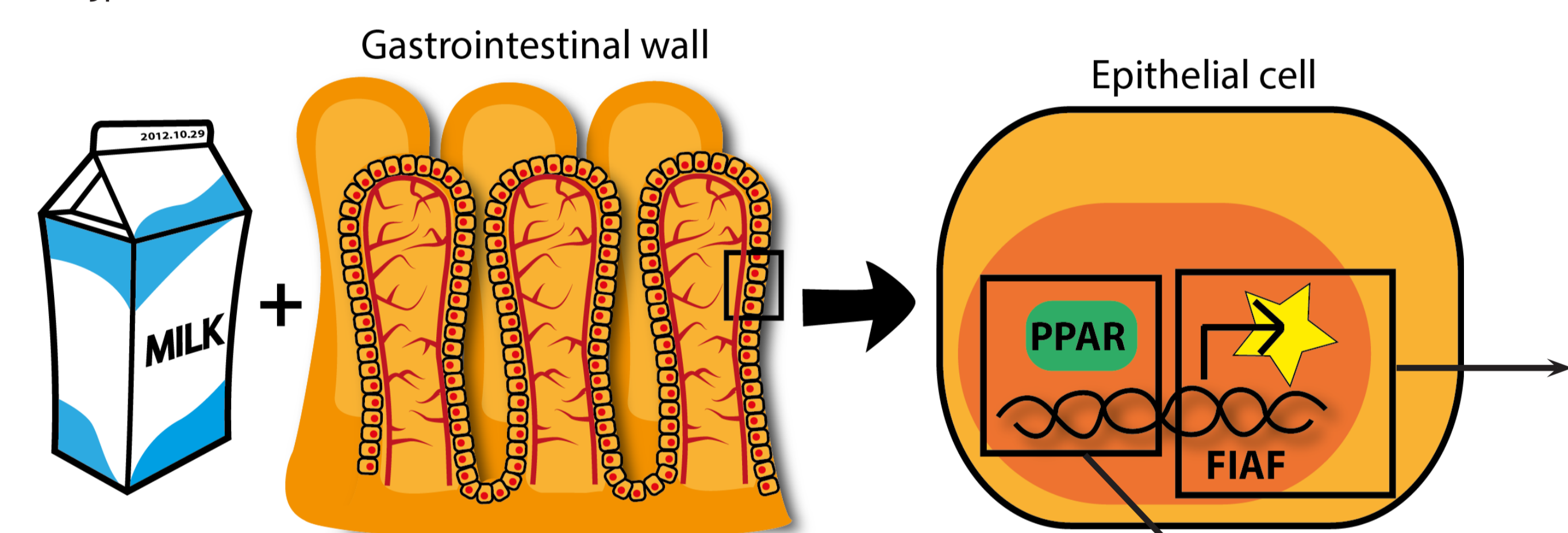
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INTRODUCTION

Dairy foods comprise a range of different products with varying nutritional components. They contain large amounts of long-chain saturated fat, which traditionally have been linked to obesity and increased risk of cardiovascular diseases. However, preliminary results have indicated that milk may have an effect on the so-called fasting-induced adipose factor (FIAF; also known as Angptl4).



OBJECTIVE

The objective is to identify and characterise FIAF-inducing milk components in bovine milk. FIAF is a potential regulator of lipid metabolism and overweight.

MATERIALS & METHODS

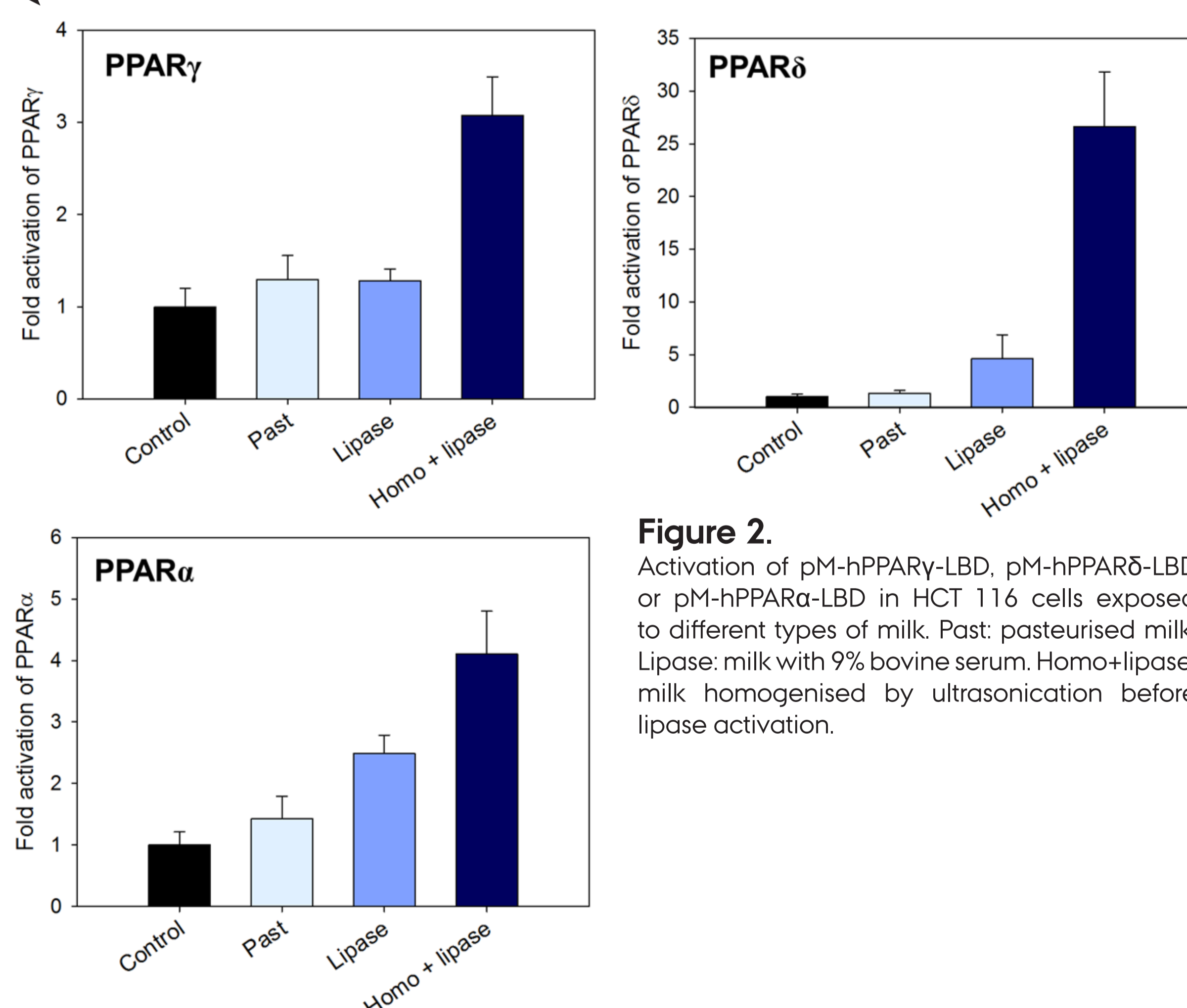
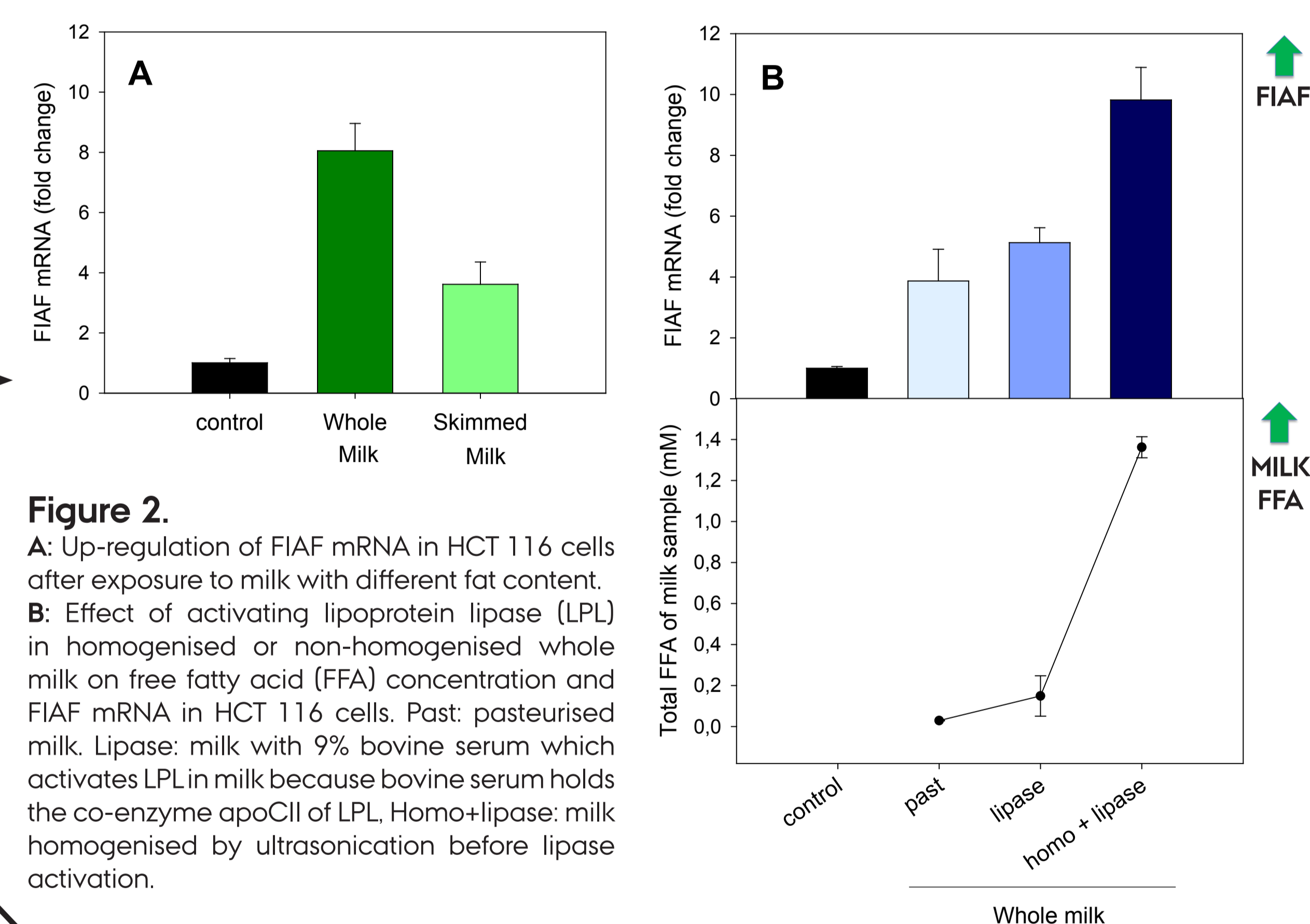
Milk's potential as regulator of FIAF was investigated in vitro using the human colon cell line, HCT116. RT-PCR was applied to measure the FIAF mRNA abundance. Ultrasound sonication was used to homogenise the milk samples, and pasteurisation was done in a water bath. GC-MS was used to quantify free fatty acids (FFA) after homogenisation and lipoprotein lipase (LPL) activation of milk. Activation of PPAR was analyzed using a luciferase reporter assay.

RESULTS

The up-regulation of the FIAF mRNA in HCT116 was higher after exposure to whole raw milk than with skimmed raw milk. This result indicates that the active compound was located in the fat fraction. The effect of the level of FFA in the milk was further investigated. Activating LPL by addition of its co-enzyme increased the level of FFA ~5 times, but did not affect the FIAF mRNA level. However, homogenising the milk before activating LPL increased the FFA ~47 times and resulted in an up-regulation of FIAF mRNA by a factor of three. Pasteurized whole milk and milk with higher concentration of FFA was investigated for their activation of PPAR isotypes, which are transcription factors known to increase FIAF gene expression. The three PPAR isotypes were only activated by milk with increased concentration of FFA.

CONCLUSION

Milk contains FIAF up-regulating compounds, which are primarily located in the milk fat fraction. The level of free fatty acid (FFA) may play a role in up-regulation of FIAF. Furthermore milk with high concentration of FFA is able to activate all PPAR isotypes.



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