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Hepatic fatty acid profile in the rat model of NAFLD: influence of sex and diet

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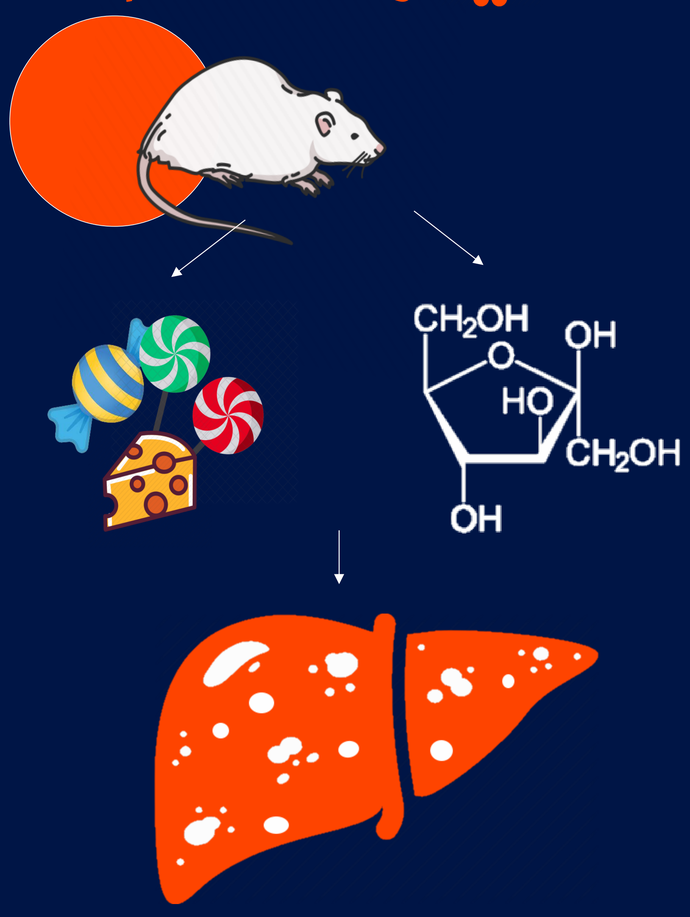
Background

Nonalcoholic fatty liver disease (NAFLD) is an important health disorder with the increasing incidence in Western countries. High-fructose and cafeteria diet rodent models have been important source of data on the pathophysiological mechanisms of NAFLD. Therefore, our aim was to investigate the differences in the hepatic fatty acid profile and the influence of diet and sex in these models.

Experimental design



Results

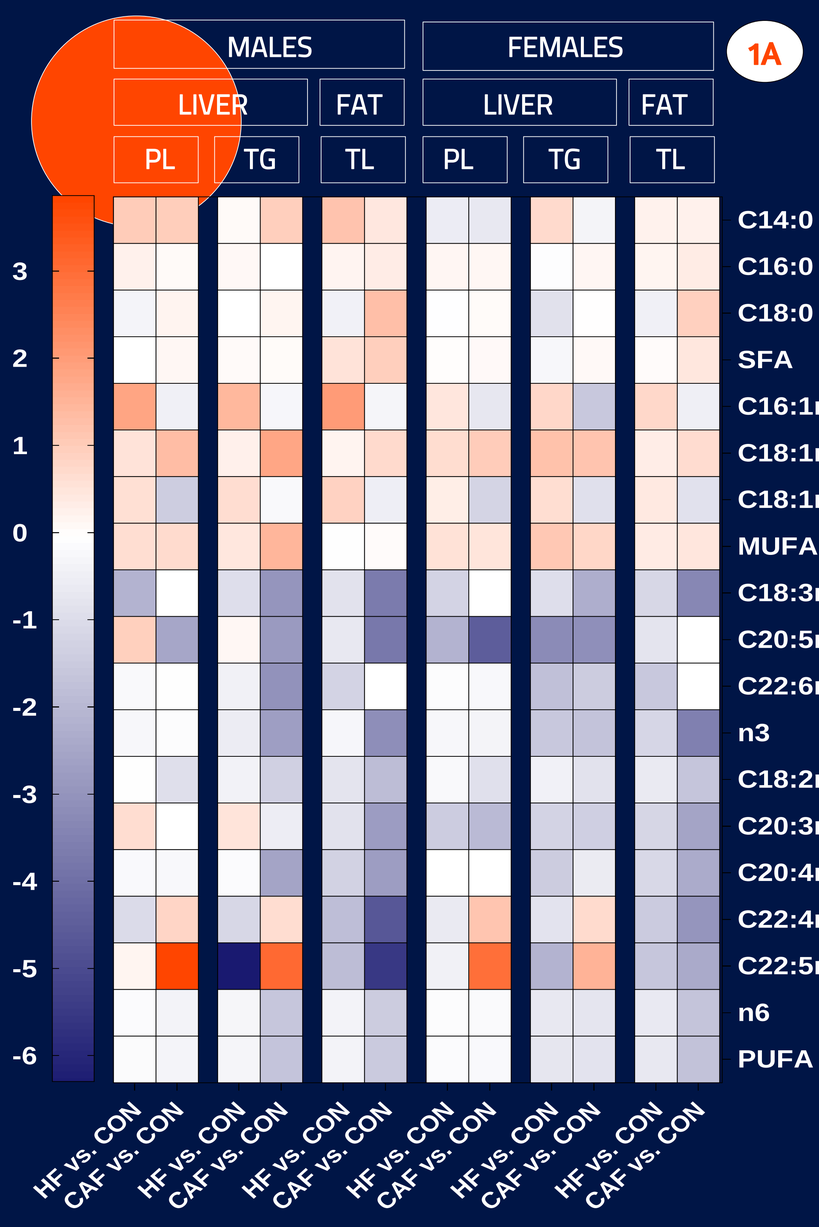


Figure 1A. Heatmap showing log2 fold change of studied fatty acids in liver phospholipids (PL), triglycerides (TG) and perirenal adipose tissue total lipids (TL). Experimental groups versus the Control group.

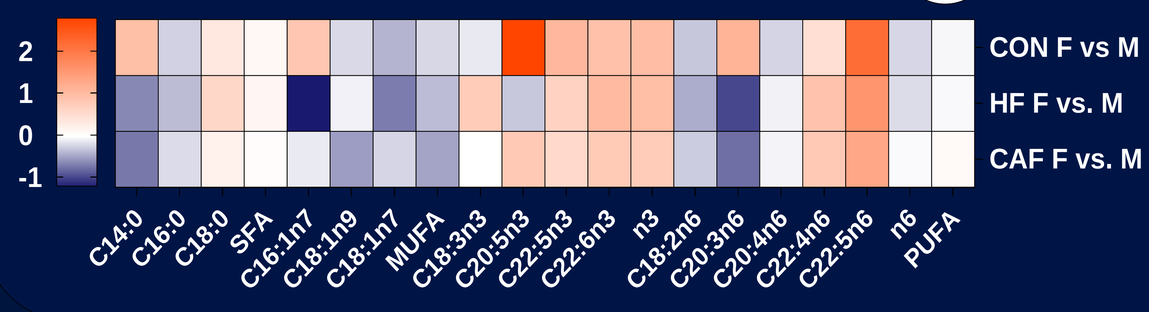


Figure 1B. Heatmap showing log2 fold change of studied fatty acids in liver Phospholipids. Females versus males.

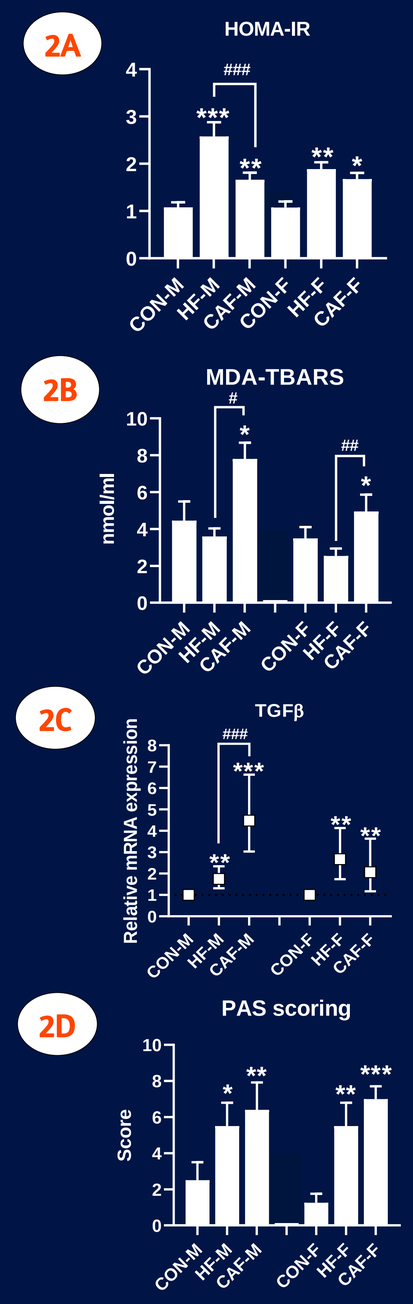


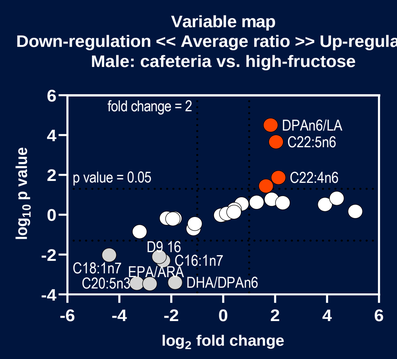
Figure 2. Different features of NAFLD in treated rats. Increased HOMA-IR index **(A).** Lipid peroxidation investigated as malondialdehyde concentration **(B).** Increased expression of inflammation markers (TGF) **(C)** and PAS staining quantification **(D).**

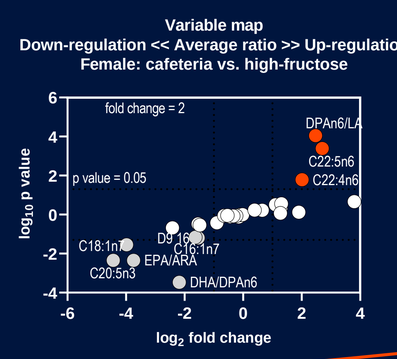
Materials and methods

Thirty-six Wistar rats (18 male and 18 female) were divided into the control group (CON), the high fructose group (HF, 15% of fructose in the drinking water) and the cafeteria diet group (CAF, 50% basal diet and 50% cafeteria diet). All dietary treatments lasted for 20 weeks. Liver histopathology was assessed by H&E, PAS and Oil red staining, lipid peroxidation was assessed by measuring MDA-TBARS and 4-HNE and the expression of the inflammation gene markers was quantified by RT-qPCR. The analysis of the hepatic fatty acid composition was performed using gas chromatography after the lipid extraction and methylation. For statistical data analysis, GraphPad 8 was used. Data were compared using the analysis of variance and Tukey post hoc test.

Conclusions

The results showed significant differences in the hepatic fatty acid profile in investigated rat models of NAFLD. The observed differences include fatty acids with important biological effects (e.g. n3 PUFA), which, therefore, must be considered in the investigations of NAFLD.





Acknowledgements

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