LIPOGENESIS AND HEPATIC CD36 EXPRESSION IN THE RESPONSE TO CAFETERIA AND HIGH-FRUCTOSE DIET

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Supported by the Croatian Science Foundation as part of the project (IP-2016-06-3163)

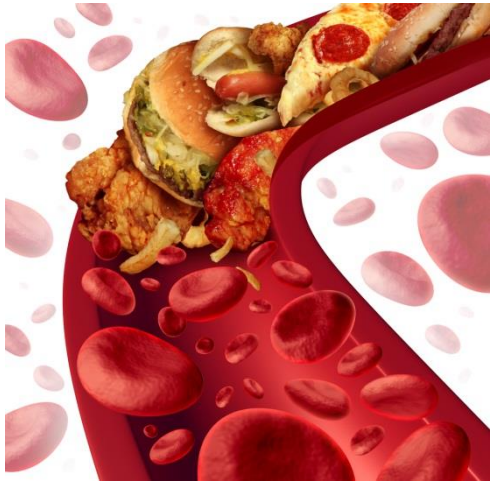
Table 1. Definitions of metabolic syndrome

	NCEP ATP III (2005 revision)	WHO (1998)	EGIR (1999)	IDF (2005)
Absolutely required	None	Insulin resistance* (IGT, IFG, T2D or other evidence of IR)	Hyperinsulinemia‡ (plasma insulin >75th percentile)	Central obesity (waist circumference§): ≥94 cm (M), ≥80 cm (F)
Criteria	Any three of the five criteria below	Insulin resistance or diabetes, plus two of the five criteria below	Hyperinsulinemia, plus two of the four criteria below	Obesity, plus two of the four criteria below
Obesity	Waist circumference: >40 inches (M), >35 inches (F)	Waist/hip ratio: >0.90 (M), >0.85 (F); or BMI >30 kg/m^2	Waist circumference: ≥94 cm (M), ≥80cm (F)	Central obesity already required
Hyperglycemia	Fasting glucose ≥100 mg/dl or Rx	Insulin resistance already required	Insulin resistance already required	Fasting glucose ≥100 mg/dl
Dyslipidemia	TG ≥150 mg/dl or Rx	TG ≥150 mg/dl or HDL-C: <35 mg/dl (M), <39 mg/dl (F)	TG ≥177 mg/dl or HDL-C <39 mg/dl	TG ≥150 mg/dl or Rx
Dyslipidemia (second, separate criteria)	HDL cholesterol: <40 mg/dl (M), <50 mg/dl (F); or Rx			HDL cholesterol: <40 mg/dl (M), <50 mg/dl (F); or Rx
Hypertension	>130 mmHg systolic or >85 mmHg diastolic or Rx	≥140/90 mmHg	≥140/90 mmHg or Rx	>130 mmHg systolic or >85 mmHg diastolic or Rx
Other criteria		Microalbuminuria†		

*IGT, impaired glucose tolerance; IFG, impaired fasting glucose; T2D, type 2 diabetes; IR, insulin resistance; other evidence includes euglycemic clamp studies.
†Urinary albumin excretion of ≥20 μg/min or albumin-to-creatinine ratio of ≥30 mg/g.
‡Reliable only in patients without T2D.
§Criteria for central obesity (waist circumference) are specific for each population; values given are for European men and women.
Rx, pharmacologic treatment.

Definition

- The metabolic syndrome is defined as a condition characterized by a set of clinical criteria: **obesity**, **insulin resistance**, **dyslipidemia** and **hypertension**



High fructose vs. Cafeteria diet

- No biological need for dietary fructose; it is only an intermediary molecule during glucose metabolism
- Often used to make food more appetizing and tempting
- Intake of fructose is excessive nowadays due to the consumption of artificially sweetened beverages and food

- Western society
- The high caloric diet, which provides animals with nutritionally varied, energy-dense and highly palatable food
- Use of grocery store-purchased food items that more closely approximate the human ultra-processed diet than commercial high-fat or high-sugar rodent diets

Wong et al. (2016); Nutrition & Metabolism, 13 (65)
Gomez-Smit et al. (2016); Physiology & Behavior, 167, 382-391

Hypothesis

- The aim of our investigation was to determine possible differences between these two models in the hepatic expression of CD36 and the fatty acid profile of total lipids
- We tested sex as a variable in both models of metabolic syndrome

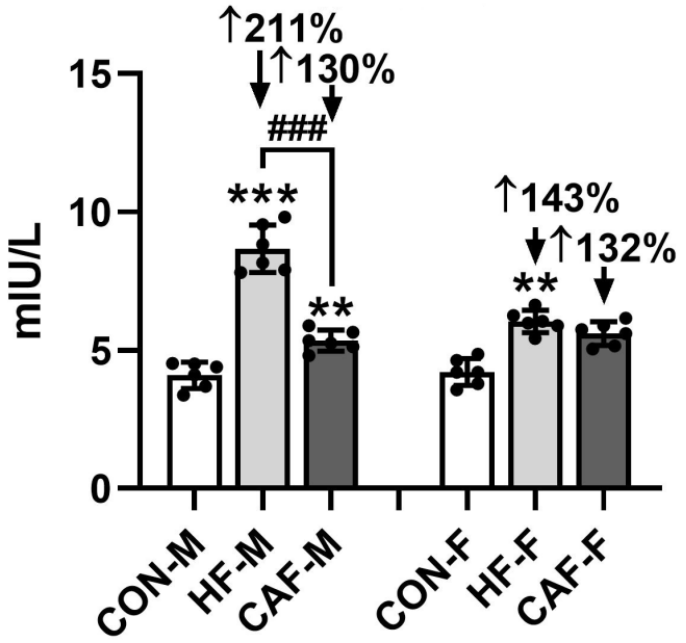
Material and methods

- Wistar rats (15 male and 15 female) were divided into:
  a) control group (CON)
  b) high fructose group (HF, 15% of fructose in the drinking water)
  c) cafeteria diet group (CAF, basal diet and cafeteria diet in the 1:1 ratio)

- The experiment lasted 16 weeks
- The statistical analysis was performed using the GraphPad 8 statistical software
- Data were compared by the analysis of variance and Tukey post hoc test

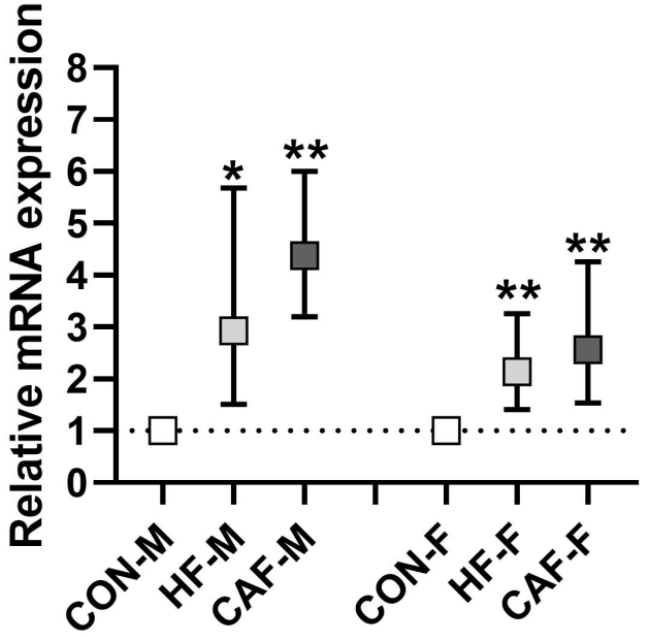
Insulin values

- To validate MetS induction we used the percentage of circulating insulin levels relative to the corresponding controls



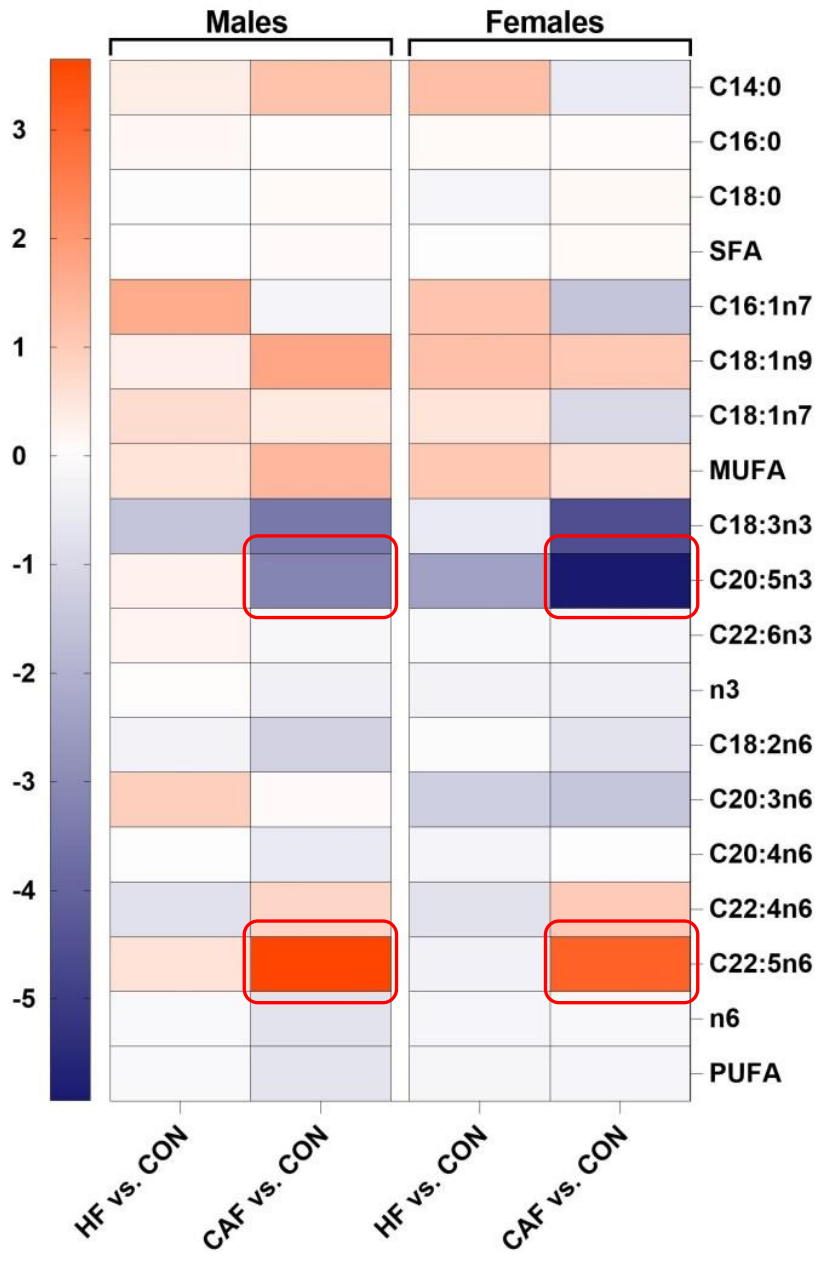
CD36 expression

- Assessed by qPCR
- Significant increase in the male and female rats fed with the CAF diet



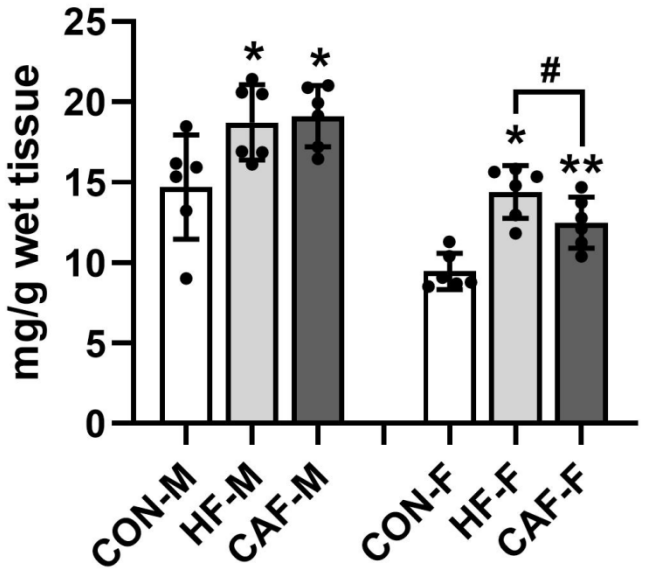
Fatty acid profile

- The metabolism of fatty acids in the rodent models and the fatty acid profile depends on the dietary treatment
- It is related to chronic inflammation
- The most significant differences were a decrease in the eicosapentaenoic acid (EPA) content and an increase in the content of docosapentaenoic acid n6DPA in the CAF diet versus the CON diet



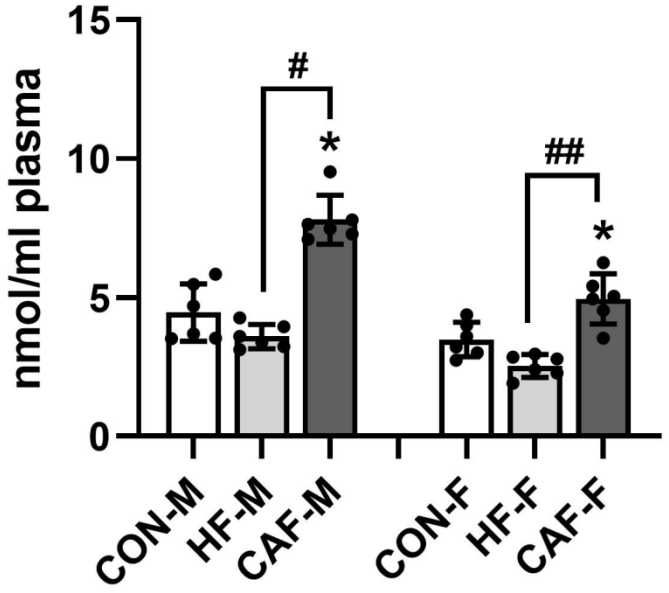
Liver triglycerides

- Measured by colorimetric quantification kit
- Both experimental diets led to the accumulation of triglycerides in the liver



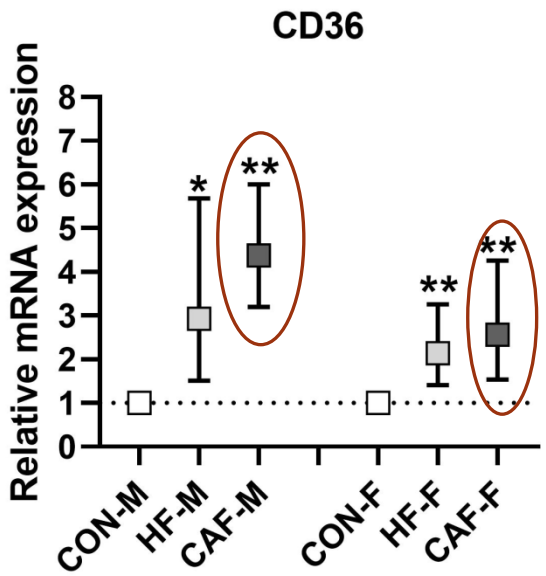
Lipid peroxidation

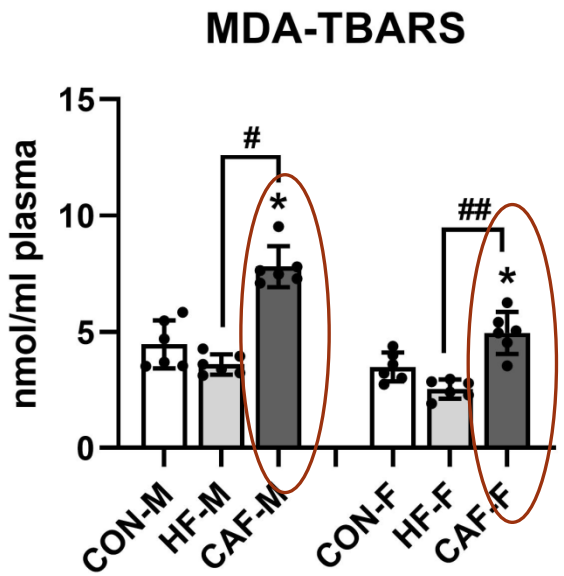
- Expressed as MDA-TBARS
- Significantly higher in the CAF group compared to the CON and HF groups



Conclusion

- The results showed that the experimental models of metabolic syndrome differ significantly in lipid metabolism and lipid peroxidation
- Male and female rats respond differently to experimental diets





Thank you for your attention! Questions?