

## Evaluation of metabolic parameters and lipid profile in white adipose tissue of animals submitted to interesterified enriched diet

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### Abstract

The western lifestyle is characterized with increased intake of processed and ultraprocessed foods, which have trans fat in their composition. As an alternative to the of trans fat, interesterification is one of the processes that have been widely used by the food industry. Thus, the aim of this study was to evaluate the role of interesterified fat on metabolic parameters, lipid profile and cellular stress markers in white adipose tissue in mice.

### Key words:

Interestesterified fat, palm oil, white adipose tissue

### Introduction

The random chemical interesterification promotes the rearrangement of hydrolyzed fatty acids in the glycerol backbone generating physical and chemical alterations in triacylglycerol (TAG) due to its new configuration. Lipids are known to be involved in many process of regulation of homeostasis and in several cellular activities, but the excess of fat can lead to development of obese phenotype and its consequences, but the role of interesterified fat in metabolism is not completely elucidated. Thus, the aim of this work was to evaluate the composition of dietary palm oil and metabolic parameters of mice fed with interesterified fat.

### Results and Discussion

Male Swiss mice with 6-weeks old were randomly divided into four experimental groups submitted to: control palm oil diet (PO), control interestesterified palm oil diet (IPO), high fat diet, with 60% of palm oil (POHFD) or high fat diet with 60% of interesterified palm oil (IPOHFD) for 8 weeks. Fasting glucose and serum lipid was evaluated after 8 weeks of diet and body mass gain was evaluated weekly. Fatty acid profile was determined by gas chromatography.

Table 1. Regiospecific distribution of fatty acids obtained from dietary sources: palm oil (PO) and interesterified palm oil (IPO)

Position of fatty acids	PO	IPO
SAFA sn-1,3	77.6	24.2
AFA sn-2	22.4	75.8
$\Sigma$ (%)	100.0	100.0
UNSAFA sn-1,3	18.1	65.9
UNSAFA sn-2	81.9	34.1
$\Sigma$ (%)	100.0	100.0

SAFA: saturated fatty acids; UNSAFA: unsaturated fatty acids.

The most abundant fatty acids on palm oil were palmitic acid and oleic acid. After interesterification, IPO (75.8%) showed that the content of saturated fatty acids in sn-2 position were higher than PO (22.4%).

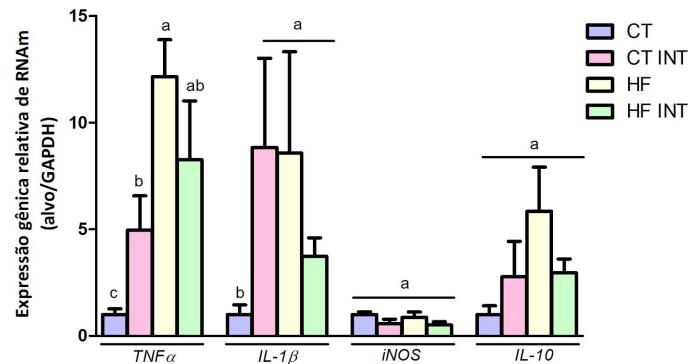


Figure 1. Relative gene expression of TNF $\alpha$ , IL-1 $\beta$ , iNOS and IL-10. CT: control group; CT INT: interesterified control group; HF: hyperlipid group; HF INT: interesterified hyperlipidic group.

The evaluation of the gene expression of the inflammatory pathway was performed using the qRT-PCR method. The data showed that the CT INT diet presented increased gene expression of TNF- $\alpha$  and IL-1 $\beta$  when compared to the unmodified lipid (CT) diet.

### Conclusions

These partial results indicate that the replacement of unmodified PO with IPO, which contain increased content of SFA in the sn-2 position, on a normocaloric and normolipidic diet could negatively modulate inflammation markers in the white adipose tissue.

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Miyamoto JÉ; Ferraz ACG; Portovedo M *et al.* Interestesterified soybean oil promotes weight gain, impaired glucose tolerance and increased liver cellular stress markers. *J Nutr Biochem.* 2018;59:153–9.