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Is citral´s anti-inflammatory action capable of changing the hypothalamic inflammation in obese mice?

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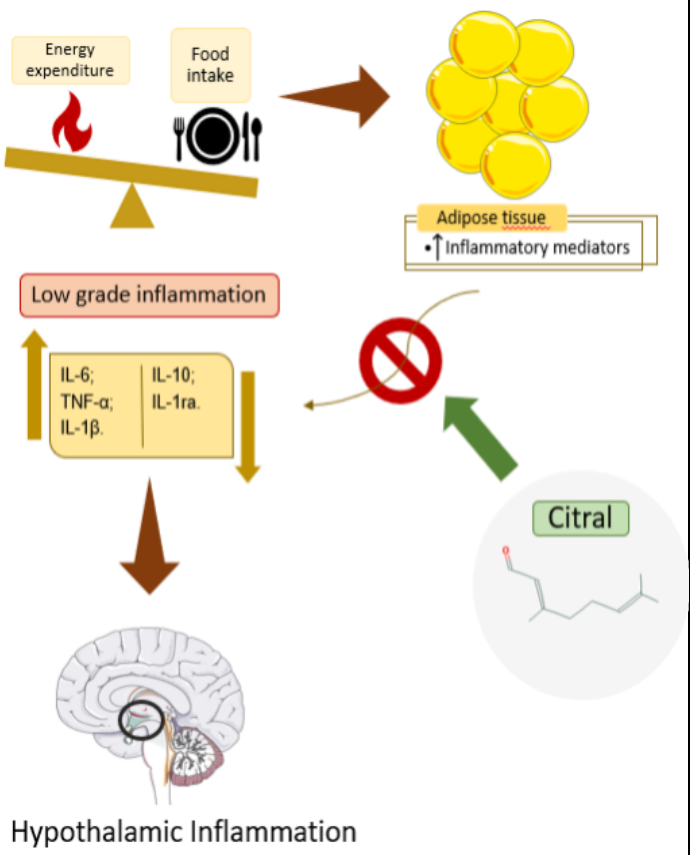
Graphical Abstract



Abstract.

Obesity is linked to an inflammatory process in the different tissues of the body, including hypothalamic regions that are crucial for energy homeostasis. Citral, is a monoterpene with anti-inflammatory, antioxidant and other activities. The aim of the present study was to evaluate the effect of citral on hypothalamic inflammation triggered by obesity in male *Swiss* mice, and to determine the effect of citral on the concentration of pro-inflammatory mediators in the tissue. Obese male *Swiss* mice were treated orally with citral (25, 100 and 300 mg/kg) for seven, 14 and 21 consecutive days. Hypothalamus samples were used to determine cytokines IL-1β, TNF-α, IL-6. Hypothalamic inflammation was not installed in the *Swiss* mice. There are different studies that report the anti-inflammatory action of citral, as well as its action on the body weight of obese mice, however C57BL/6J mice have a better profile in the investigation of indicative parameters of diet-induced obesity. An analysis of the action of citral on hypothalamic inflammation and evolution of body weight in other strain, like C57BL/6J mice is relevant.

Introduction

The high rate of obesity is a problem that affects people in Brazil and throughout the world. Obesity is linked to an inflammatory process in the different tissues of the body, including hypothalamic regions that are crucial for energy homeostasis. Therefore, a search for a therapy that modulates the neural machinery is an interesting strategy for the treatment of obesity. An important potential therapeutic alternative is citral, a monoterpene which is the major component of essential oils, like lemon grass (*Cymbopogon citratus*) and ginger (*Zingiber officinale*), with anti-inflammatory, antioxidant and other activities. Thus, the aim of the present study was to evaluate the effect of citral on hypothalamic inflammation triggered by obesity in male *Swiss* mice, and to determine the effect of citral on the concentration of pro-inflammatory mediators in the tissue.

Materials and Methods

Obesity was induced in male *Swiss* mice (n=10) for 12 weeks on a high-fat diet (60% calories from fat). Citral treatment was administered orally in mice at doses of 25, 100 and 300 mg/kg for seven, 14 and 21 consecutive days. Hypothalamus samples were used to determine cytokines IL-1β, TNF-α, IL-6 through Luminex multiplex assays. The quantified data are presented as the mean ± S.E.M. Parametric data was calculated using Student´s t-test and one way ANOVA followed by Bonferroni test, the results were considered statistically significant at $p< 0,05$. All experiments were approved by Animal Ethics Committee (AECs), Institute of Biosciences - UNESP, Botucatu under protocol nº 1115.

Results and Discussion

Our results have shown that hypothalamic inflammation was not installed in the *Swiss* mice, and it is not possible to analyze an action of the citral on the pro-inflammatory cytokines. In the literature, there are different studies that report the anti-inflammatory action of citral, as well as its action on the body weight of obese mice, however other experimental protocols have been used. C57BL/6J mice have a better profile in the investigation of indicative parameters of diet-induced obesity.

Conclusions

An analysis of the action of citral on hypothalamic inflammation and evolution of body weight in other strain, like C57BL/6J mice is relevant.

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