Mint oils: *in vitro* anti-inflammatory effects tested in porcine alveolar macrophages

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OVERVIEW

- Introduction
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INTRODUCTION

PORCINE ALVEOLAR MACROPHAGES (PAMs)

Fig 1. LPS induces the production of TNF-α in PAMs cells. (Li et al. 2018).
Mentha (mint) is a genus of an aromatic herb and pepper mint and spearmint are among the most important crops in EOs production owning the abundant content of phenolic compounds. (Wu et al. 2019)
The research objective of the study was to measure the *in vitro* anti-inflammatory effects of peppermint oil and spearmint oil with porcine alveolar macrophages as host immune responses.
**MATERIALS & METHODS**

**EXPERIMENTAL DESIGN AND TREATMENT**

- **RCBD** with dose and LPS as fixed effects and pig as random effects (n=12).
- The PAM cells were treated with pepper and spearmint oils:
  - 2 (doses of LPS – 0 or 1 µg/mL) × 5 (doses of mint oil – 0, 25, 50, 100, 200 µg/mL).
**MATERIALS & METHODS**

**SAMPLE COLLECTION AND ANALYSIS**

- Macrophages were harvested from the bronchial lavage of *6 pigs* at *6 weeks* of age and seeded into 24-well plates with at $10^6$ cells/mL.
- The concentration of TNF-α was performed by ELISA assay into 96-weel plates.
- Cell viability was tested by the MTT assay.
- Data were analyzed by the MIXED of SAS 9.4.

The protocol for this study was approved by the Institutional Animal Care and Use Committee at the University of California, Davis.
**Fig 6.** The concentration of TNF-α secreted by PAM treated with peppermint oil influence the production of tumor necrosis factor-α (TNF-α) in the absence or presence (1 μg/mL) of lipopolysaccharide (LPS). Cells were incubated with various peppermint concentrations (0, 25, 50, 100, 200 μg/mL) for 24h. All dose were not toxic for the cells according to MTT tests. The results were means of values from 6 pigs.
Fig 7. The concentration of TNF-α secreted by PAM treated with spearmint oil influence the production of tumor necrosis factor-α (TNF-α) in the absence or presence (1 μg/mL) of lipopolysaccharide (LPS). Cells were incubated with various spearmint concentrations (0, 25, 50, 100, 200 μg/mL) for 24h. All dose were not toxic for the cells according to MTT tests. The results were means of values from 6 pigs.
The *in vitro* experiment on PAM with mint oils indicated that:

- Mint oils **dose-dependently reduce** the secretion of TNF-α by PAMs challenged with LPS (1 µg/mL).
- Thus, peppermint and spearmint oils had **anti-inflammatory** activities *in vitro*.
- *In vivo* animal trials will be conducted to evaluate their impacts on animal health and performance.
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