



Acute (nose-only) aerosol exposure to fruity and tobacco flavored ENDS alters lung inflammation in mice

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INTRODUCTION

- E-cigarette use is on the rise in western population
- Adults and adolescents have preferences toward fruit-flavored e-liquids
- Flavoring chemicals used in e-liquids are generally recognized as safe for ingestion
- Flavoring chemicals have been shown to increase inflammation in lung epithelial cells and monocytes

HYPOTHESIS

We hypothesize that the use of flavored ENDS products will result in an increase in inflammation in the lungs of exposed mice

METHODS

Nose-only exposure tower/system



- Male and female C57BL/6J mice, 10 weeks old were exposed for 3 days to air, PG/VG, Apple, Cherry, Strawberry, Smooth & Mild Tobacco, and Wintergreen flavored 0 mg nicotine ENDS products for 1 hour/day
- Mice were exposed to a profile of 2 puffs/minute with a puff volume of 51 ml
- Differential cell counts were measured using flow cytometry with markers F4/80 (macrophages), Ly6B.2 (Neutrophils), CD4 (CD4 T-cells), and CD8 (CD8 T-cells)
- Flavoring Chemical concentrations were determined using H¹-NMR

RESULTS

Table 1: Chemical concentration of e-liquids

Flavor	Flavoring Chemical	Concentration (mg/ml)
Apple	Hexyl Acetate	0.21 mg/ml
	Ethyl Maltol	0.49 mg/ml
Cherry	Benzaldehyde	0.093 mg/ml
Strawberry	Ethyl Maltol	0.25 mg/ml
	Maltol	0.17 mg/ml
Wintergreen	Methyl Salicylate	8.31 mg/ml
Smooth & Mild Tobacco	Maltol	1.10 mg/ml

Figure 1: Differential Effects of Apple Flavored ENDS Exposure

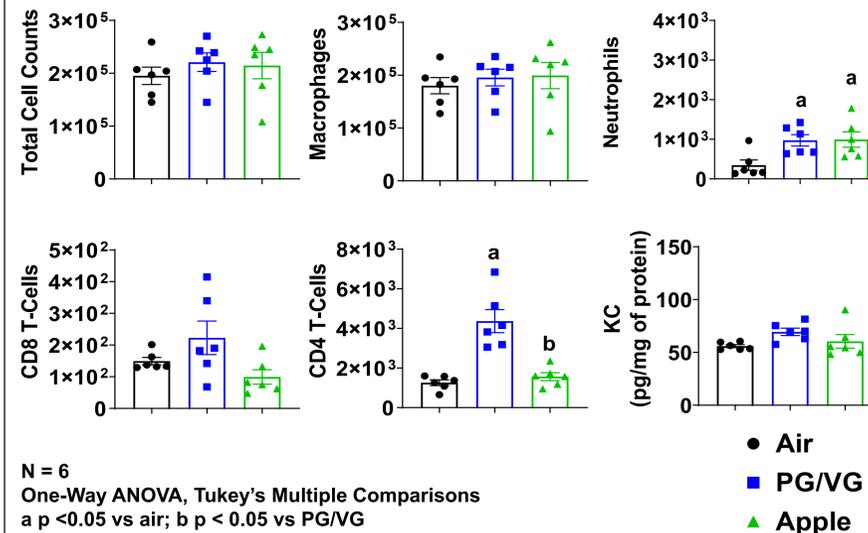


Figure 2: Differential Effects of Cherry Flavored ENDS Exposure

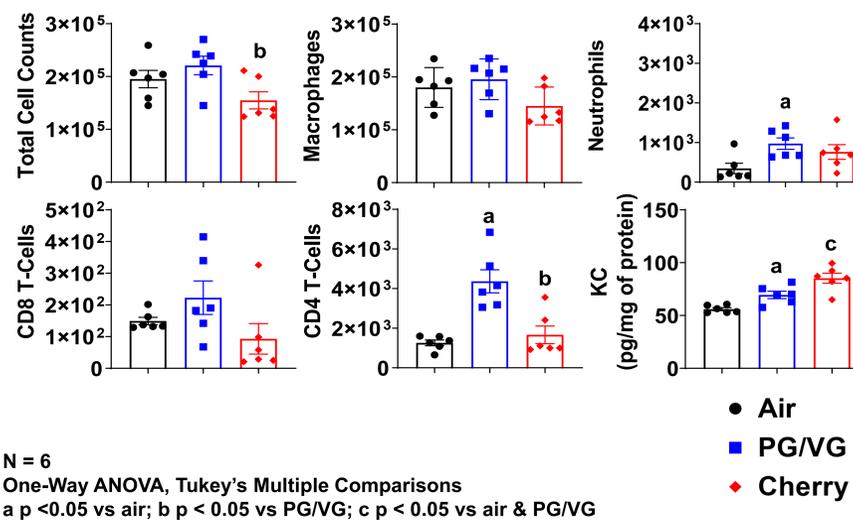


Figure 3: Differential Effects of Smooth & Mild Tobacco Flavored ENDS Exposure

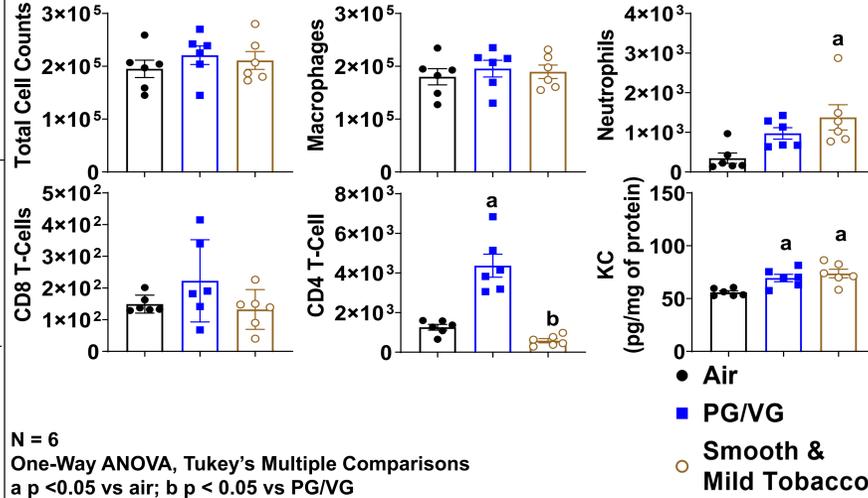


Figure 4: Differential Effects of Strawberry Flavored ENDS Exposure

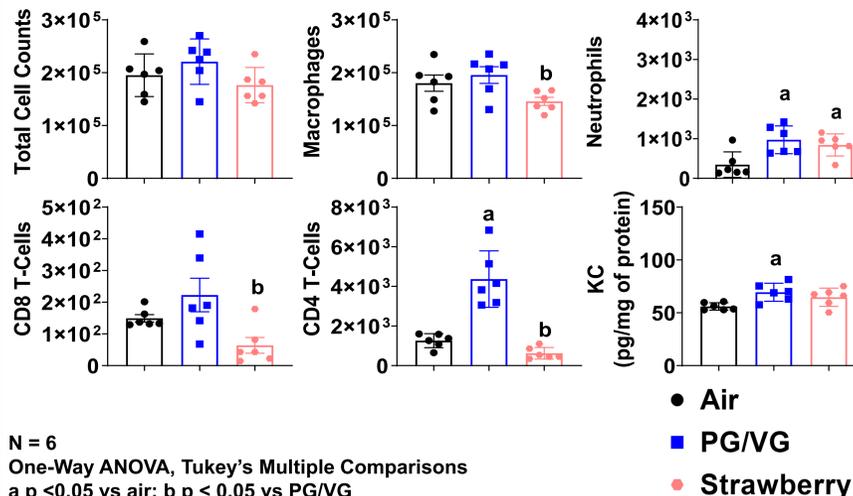
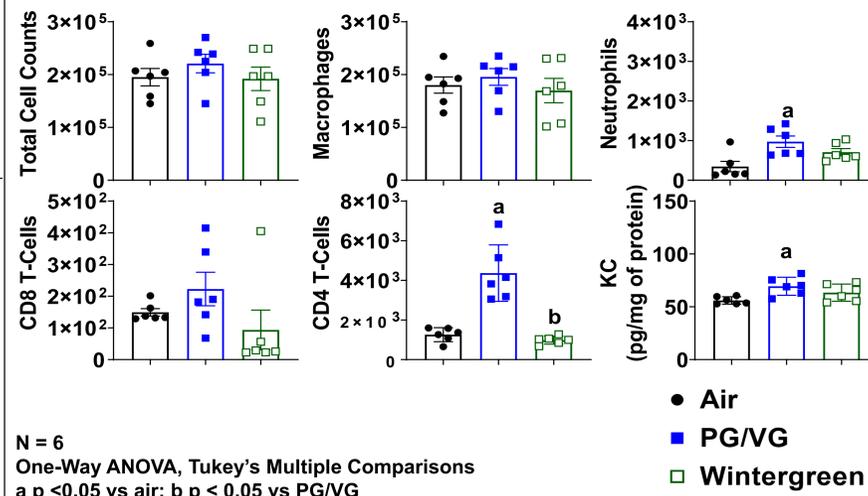


Figure 5: Differential Effects of Wintergreen Flavored ENDS Exposure



SUMMARY

- Five flavoring chemicals (hexyl acetate, ethyl maltol, benzaldehyde, maltol, and methyl salicylate) were quantified in our flavored e-liquids
- Neutrophil cell counts was increased in PG/VG, Apple, Smooth & Mild Tobacco, and Strawberry exposures compared to air controls in BALF
- CD4 T-cells were increased in PG/VG compared to air controls and to all exposures in BALF
- KC levels were increased in PG/VG, Cherry, and Smooth & Mild Tobacco exposures in lung homogenate

CONCLUSIONS

- Although five flavoring chemicals were identified and quantified multiple other chemicals were present in the flavored e-liquids
- Exposure to flavored ENDS products resulted in the initiation of lung inflammation with infiltration of neutrophils
- Chronic exposure to flavored ENDS products may result in lung injury due to chronic inflammation

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