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Basic Science

Abstract Title
Investigating the Role of Wood Smoke Exposure on Murine Lung Fibroblast

Background
Wildfire cases have increased over the years, with Manitoba experiencing 1.55 million hectares of land burned this year. Lung integrity is supported by lung fibroblasts through Extracellular Matrix secretion. However, the impact of wood smoke exposure on lung physiology remains unclear.

Objective
Our aim is to primarily investigate the role of wood smoke exposure in lung fibroblasts.

Methods
5 g wood pellets are burned for 30 mins at 450°C producing Wood Smoke Extract (WSE), diluted to concentrations of 0.01%, 0.05%, 0.1%, 0.5%, 1%, 5%, 10% and 20% treated to Murine Lung Fibroblasts (CCL-206) with either filtered or non-filtered-WSE. Wound healing assay was performed for 24 hours. Wood smoke (WS)-derived particle mass was quantified, and the particle sizes derived from WSE were measured by ZetaPALS. The pH levels and the WSE variability between experiments were analyzed by measuring the OD 320 nm of the WSE solution.

Results
Wound healing analysis showed no significant wound closure on CCL-206 after 24 hours of WSE (0.01%, 0.05% and 0.1%) treatment ($p < 0.05$) in comparison to the control. However, CCL-206 treated with 0.5%, 1%, 5%, 10% and 20% WSE, displayed significant wound closure ($p < 0.001$) at 24 hours. No wound closures were observed for filtered-WSE-treated fibroblasts (0.5%, 1%, 5%, 10% and 20%) with abnormal morphology and cell loss observed for non-filtered and filtered-WSE at those concentrations. The average effective size of the particles collected from fresh WSE was 870.6 nm. Moreover, the average particle mass collected from WS was 57.6 mg after overnight drying. High reproducible smoke solution (r2 value = 0.8380) was determined by linear regression with acidic pH levels.

Conclusion
Exposure to high concentrations of WSE on CCL-206 resulted in irregular morphology, inhibited cell migration, and cell loss. Our next steps include determining gene expression of fibrotic, and oxidative markers along with WSE composition.

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