

Presenting Author Name

Fiona Fan

Presenting Author Category

Undergraduate Student

Research Category

Basic Science

Abstract Title

Role of Wood Smoke Exposure in Human Lung Fibroblast

Background

Wildfire smoke contains particulate matter (PM) and other toxins, which can cause over 80000 premature deaths annually. Fibroblasts are a type of structural cell that contributes to tissue remodelling after injury, while the effect of wildfire smoke exposure on human lung fibroblasts remains unclear.

Objective

We aim to investigate the impact of wood smoke exposure on human lung fibroblasts' functionality.

Methods

Wood smoke extract (WSE) was produced by bubbling the smoke generated from burning 5g of ground wood pellet for 30 minutes into 30 mL of PBS. The PM generated by burning wood pellets was collected with a PVDF membrane to estimate the mass. The quality of the WSE was determined by generating an absorption standard curve at 320 nm. Stretch assays were performed on human lung fibroblasts (MRC5 cells) treated with different WSE concentrations, and the percentage of wound closures were quantified at 0, 24 and 48 h.

Results

Linear regression demonstrates a highly reproducible WSE solution ($R^2 = 0.838$, $n = 8$). The average mass of PM collected from burning 5g of wood pellet for 30 minutes was 156.9 ± 89.9 mg (mean $\pm$ SD). In 0.01%, 0.1%, 5%, and 10% WSE treatments, the cell morphology remained in a normal spindle shape; however, the cells started to detach from the growing surface and changed to an abnormal shape when treated with 0.5% and 1% WSE. Moreover, a significant wound closure percentage difference was observed between the control and 1%, 5% or 10% WSE treatment at 24 and 48 h ($p < 0.0001$), respectively. MRC5 cells treated with 1% WSE were completely detached from the culture flask after 24 h.

Conclusion

Exposure to 0.5%, 1%, 5% and 10% WSE for 24 and 48 h impair morphology and wound healing function of human lung fibroblasts. More detailed molecular mechanisms on MRC5 cells in response to WSE require further investigation.

Authors

Name	Role	Profession
Fiona Fan	Presenting Author	Undergraduate
Bianca Ysabelle Regenio	Co Author	Undergraduate
Xinhui Wu	Co Author	Assistant Professor