

The Adverse Effects of Sugarcane Burning on Human Airway Epithelial Cells

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Sugarcane Harvesting



<http://earthobservatory.nasa.gov/Features/AmazonFireRise/page2.php>

The Process

- The most commonly used and economical method of sugarcane extraction - setting fire to the fields
- Eliminate the majority of the “waste” components of the plant leaving behind only what can be used
- Reduce a large amount of manual labor

Implications

- An uncontrolled process that generates uncontrolled smoke including fine particulate matter ($\leq 2.5 \mu\text{m}$, $\text{PM}_{2.5}$)
- Affect air quality in the surrounding areas
- $\text{PM}_{2.5}$ is associated with airway inflammation (e.g., asthma and COPD)
- Exposure to this smoke is linked to increased hospital visits (e.g., pneumonia, asthma and allergic rhinitis), hypertension, and genomic instability

Implications (Trujillo, Peru)

- A major area of sugarcane plantations in Peru
- Increased prevalence of airway inflammatory symptoms (Dr. Kenny Briceno, a local pediatrician)



Central Hypothesis

PM ($\leq 2.5 \mu\text{m}$, PM_{2.5}) generated during sugarcane burning can induce stratified oxidative stress responses in human bronchial epithelial cells including oxidative stress, inflammation and cell death.

Specific Aims

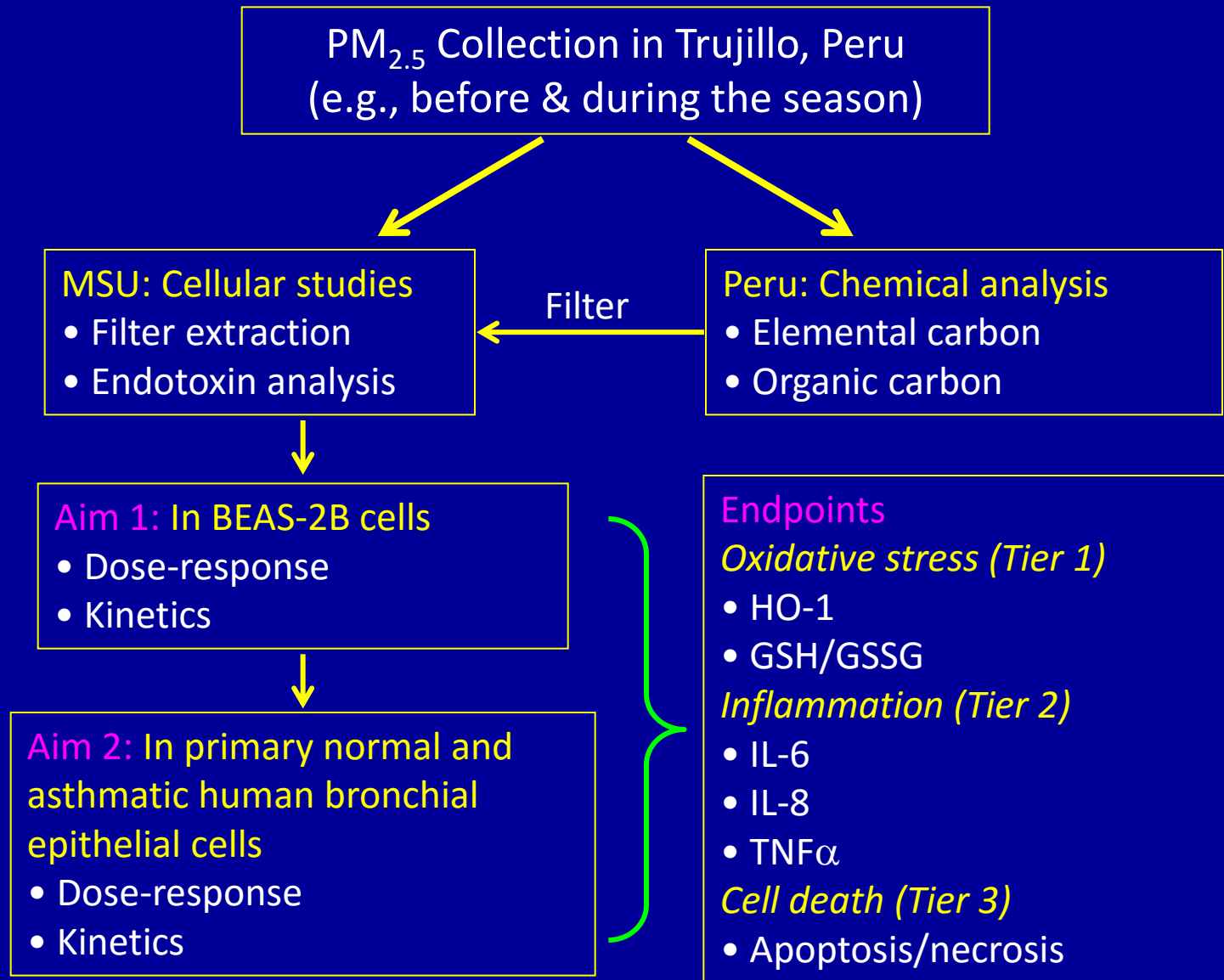
Aim 1

Determine the effects of $PM_{2.5}$ on human bronchial epithelial cell line BEAS-2B, an established and widely used model for studying the respiratory effects of various air pollutants.

Aim 2

Determine the effects of $PM_{2.5}$ on primary normal and asthmatic human bronchial epithelial cells (i.e. determine whether pre-existing condition can increase individual's susceptibility)

Overall Outline

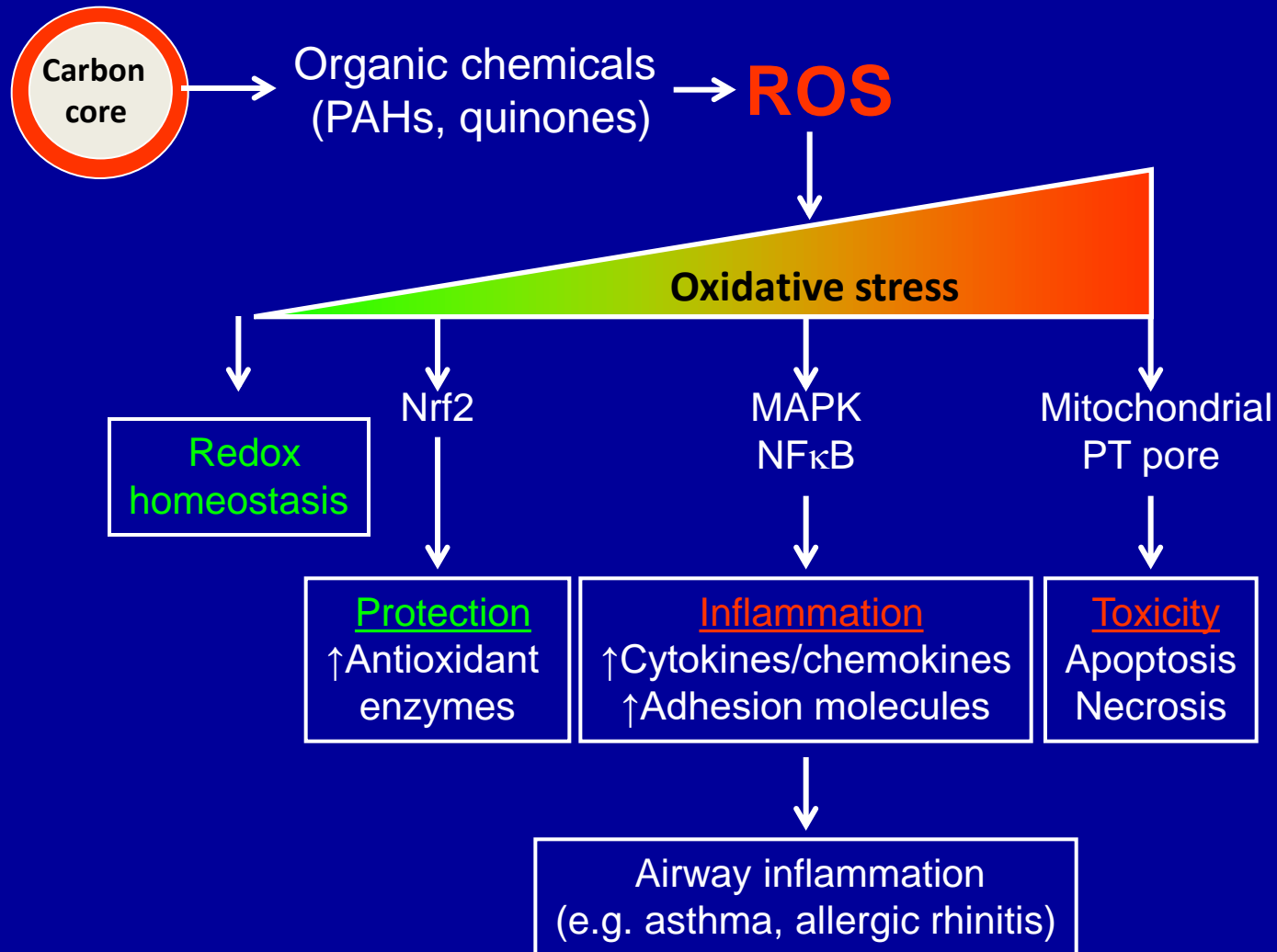


Particle Collection

- TISCH Wilbur PM 2.5 Particle Collector
- Provided by Universidad Cesar Vallejo in Trujillo, Peru



Stratified Cellular Oxidative Stress Response



Goals

- To find a correlation between living proximity to the sugarcane burning and increased airway inflammatory symptoms
- Predict the symptoms that may be encountered in order to better equip the physicians to treat the patients affected

Work Cited

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Thank You!

