CHRD 2024: Abstract Submission Form

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Presenter Status
Non-Trainee

Role in the project
Perform Experiments
Analyze Data
Write Abstract

Research Category
Basic Science

Title
To vape or not to vape? DNA methylation in the lungs is altered by e-cigarette exposure.

Background
E-cigarettes were initially marketed as a safer alternative to tobacco smoking, but their increasing use among young adults without a smoking history is alarming. Previously, our team identified gene expression changes associated with e-cigarette use that hint at risk for future chronic lung disease. However, the long-term persistence of these molecular changes and how they affect mechanisms of disease development remains uncertain.

Objective
We hypothesized that e-cigarette use modifies DNA methylation (DNAm) patterns in lungs, contributing to an increased risk of lung disease development.

Methods
Samples of healthy tissue were obtained from lung resections in 21 individuals (18-53 years old) who underwent surgery for a primary spontaneous pneumothorax. We extracted both DNA and RNA from lung tissues and quantified DNAm levels using the Infinium MethylationEPIC array. A linear regression from the limma package was used to test for DNAm differences between vaping (N=11) and non-vaping (N=10) individuals.

Results
We identified 347 differentially methylated CpG sites (DMPs) in 224 individual genes including NAV2, RUNX1, PTPRN2 and SMC4, which have been associated with lung disease development. We also identified 44 differentially methylated regions (DMRs) mapping to 32 known genes. Gene ontology analysis of DMRs revealed functions associated with inflammation and apoptotic pathways in lungs. This finding supports our previous conclusions based on transcriptomic data that ongoing epithelial layer regeneration is occurring in lungs to repair damage from e-cigarette exposure.

Conclusion
We found distinct DNAm patterns in lung cells exposed to e-cigarettes when compared to non-users. DNAm changes can last significantly longer than transcriptomic ones, suggesting a long-lasting increase in the risk of lung disease due to e-cigarette use. Ongoing research will determine the precise cellular pathways linking persistent e-cigarette use to the long-term risk of lung disease development.

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No

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