European Cystic Fibrosis Society

Journal of Cystic Fibrosis
The Official Journal of the European Cystic Fibrosis Society

Cystic Fibrosis Research News

Title:
Metabolomics profiling of tobacco exposure in children with cystic fibrosis

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What was your research question?
The air our children breathe greatly impacts them. We aimed to determine how exposure to secondhand tobacco smoke changes blood chemicals (metabolites) in young children with cystic fibrosis.

Why is this important?
Second -hand smoke exposure is associated with many negative effects in young children with CF, including poor growth and increased infection and inflammation. Our group has shown

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that secondhand smoke exposure remains very common in children with CF despite extensive education on the harms of smoke exposure in children. Further, we have a limited understanding of the mechanisms by which secondhand smoke causes harm in children with CF. With an improved understanding of how secondhand smoke exposure causes harm in CF, we can develop new ways to treat young children with CF while working with caregivers to decrease smoke exposure.

What did you do?

We measured chemicals (metabolites) in the blood of infants and young children with and without CF. We also measured nicotine (chemical found in tobacco products) levels in hair samples to determine who had long-term exposure to tobacco smoke. We then compared patterns in metabolites between infants or children with and without secondhand tobacco exposure. We used the patterns of metabolite changes to determine which chemical pathways are altered by secondhand smoke exposure.

What did you find?

We found unique changes in blood metabolite patterns based on age and exposure to secondhand smoke. We identified several specific metabolite pathways and regulators of metabolite production that were associated with secondhand smoke exposure. We also determined which body organs showed the highest changes in metabolites after smoke exposure, and these organs were different based upon age. Finally, we verified specific blood markers of increased damage to cells in infants and children with secondhand smoke exposure. Together, the unique metabolite patterns identified provide exciting areas for future research.

What does this mean and reasons for caution?

Our results highlight that secondhand smoke exposure is an important factor in early CF disease. Altered blood metabolites may help develop new treatments for children with CF and smoke exposure through identification of the blood factors altered by smoke exposure. Blood metabolite patterns can also help us provide caregivers with advice about stopping smoking or reducing exposure to their children. However, it will be important to replicate our findings in larger groups of infants and children and see how metabolite patterns change over time. It is also important to determine if metabolite changes with smoke exposure are the same in different countries. Further studies are needed to determine how these metabolite patterns are impacted by new drugs called CFTR modulators which greatly enhance patient health.

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What's next?

Findings from this study will be compared to children who have exposure to electronic cigarette (e-cigarette) vapours, as e-cigarette use is increasing rapidly worldwide. We will also determine how new medications such as CFTR modulators can affect the altered metabolite patterns in children with secondhand smoke exposure.

Original manuscript citation in PubMed

https://pubmed.ncbi.nlm.nih.gov/32487493/?from_single_result=Metabolomics+profiling+of+tobacco+exposure+in+children+with+cystic+fibrosis