

Investigating the Environmental Exposure Risks of Asthma

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Motivation

The motivation of this proposed study is to discover which xenobiotics contribute to asthma severity and control by mediating known asthma-related internal biomolecules.

Project Description

- The proposed studies aim to utilize biomonitoring and bioinformatics approaches to identify specific toxic-biologic pathways and validate them in human cellular systems. To accomplish this, the following three specific aims are proposed:
- Aim 1:** Characterize asthma-related organic contaminants and xenobiotics from the external and internal exposome profiles from a well-characterized local asthma cohort.
- Aim 2:** Determine asthma-related internal biomolecules in cross-sectional blood samples from a well-characterized local asthma cohort.
- Aim 3:** Perform multivariate mediation analysis based on the results of the exposome profiles, internal biomolecules, and asthma biomarkers, then validate the hypothesized xenobiotic-biomolecule-asthma pathways by human cell lines.

Investigating the contributions of environmental pollutants to asthma severity and control

Context

- Genetics alone only accounts for 10-30% of the risks for human complex diseases while environmental factors contribute to the rest.
- Asthma is a common disease, which develops due to complex interactions of genetic and environmental factors, with genetics only contributing as lowest as 25% to the pathobiology.

Project Deliverables

- The proposed works described herein not only address an urgent public health need but also align directly with multiple environmental health priorities to better understand the health effects of environmental exposures and the extent to which airborne exposures contribute asthma control and severity. This highly significant project will generate novel associations between xenobiotics exposures and asthma biomarkers at both individual and cohort levels from a molecular perspective.
- The results of these aims will be used to develop a competitive R01 submission as an outcome of this grant, helping me to become an established investigator in environmental health sciences and allowing me to utilize the exposomics approach to investigate the etiology of more idiopathic and chronic diseases.

Potential Impact

- The significant contributions from this proposal are expected to provide strong scientific justification for environmental pathobiology underlying asthma severity and control by integrating both epidemiological and experimental studies.
- The investigator hopes that the information obtained from this research and the corresponding studies will lead to innovative medical prevention and insight into the pathobiology of asthma severity and control. This may ultimately lead to a reduction in the morbidity and mortality associated with asthma.

References

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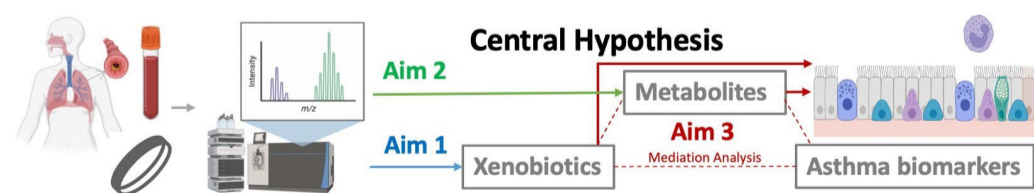


Fig 1: The workflow schematic of leveraging exposomics to investigate the pathobiology of asthma.

