Abstract

Concerns have been raised regarding the potential for consumer products, including cleaning products, to cause or exacerbate asthma or asthma-like responses. Although many forms of asthma are inflammatory-based, some are low molecular weight, alkalinized, and are thought to trigger immunoglobulin E (IgE) independent occupational asthma. Single assays for potential respiratory sensitization may not be able to detect all the complex etiologies associated with asthma, leading to inaccurate classification. This evaluation focuses on assays for possible mechanisms of sensitization, not irritation. In general, the intent was to focus on assays that can be used to determine whether a particular ingredient, or chemical, causes or exacerbates asthma or asthma-like responses, and how that ingredient might be involved in the development of asthma. We used published literature to identify available assays and models, and to develop a decision tool that can be used to evaluate consumer product exposures. This is intended to be a risk assessment tool, or a model for predicting potential asthma risk. The next step is to expand upon the work on previous frameworks and test an enhanced framework with multiple case studies.

Discussion

Is there a single recommended framework that can be used directly?

No, there are multiple aspects from multiple frameworks that could be used to create a modified approach. Elements that we think would be critical for a refined framework include:

- Clear description of the scope and purpose of the framework.
- Capturing the nuances of mechanism of action (i.e., allergic versus non-allergic induction).
- Relationships to exposure considerations.
- A WOE approach is needed and no single assay is definitive.

No single biomarker that is specific to asthma or consistently found in conjunction with asthma.

Multiple MOAs likely exist and the lines of evidence need to incorporate MOA.

There is uncertainty about key immunological events in the sensitization of the respiratory tract.

The role of non-allergic asthma (e.g., RADs) variants is controversial.

To what degree have bioassays been validated in assessing respiratory sensitization and asthma?

No test is 100% accurate, there will always be false positives and negatives. For example, some gold standards for dermal and respiratory sensitization or irritation (e.g., LLNA and MPT) are inexact in their ability to detect 90% accurate results.

A thoughtful and reasoned approach for interpreting test results and combining evidence from multiple assays.

Assay development is active. Some assays need additional surrogates, immunosuppression, immunostimulation, and risk assessment.


to be used to develop a decision tool that can be used to evaluate consumer product exposures. This is intended to be a risk assessment tool, or a model for predicting potential asthma risk. The next step is to expand upon the work on previous frameworks and test an enhanced framework with multiple case studies.