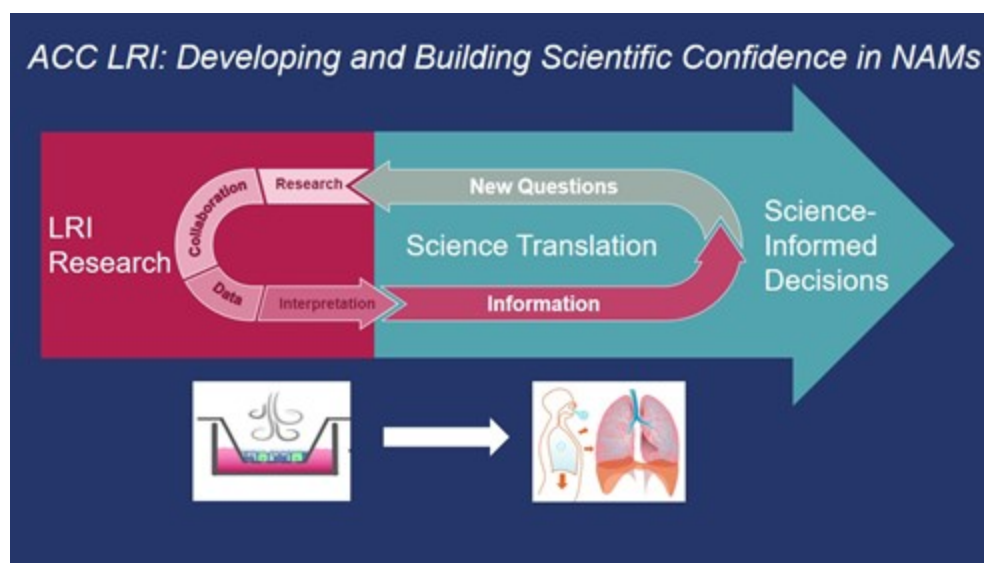




Science Highlight from the ACC LRI | April 14, 2021

## Improving *In Vitro* Methods to Evaluate Respiratory Tract Exposures



[Click here to access the new publication](#)

“Development of an *in vitro* approach to point-of-contact inhalation toxicity testing of volatile compounds, using organotypic culture and air-liquid interface exposures”

Inhalation is a major exposure route for humans, and the first point of contact with inhaled substances (gases, aerosols and particulates) is with cells that line the respiratory tract.

- The traditional approach for evaluating the toxicity of exposures via the respiratory tract is to conduct studies by exposing laboratory animals to inhalable gases, aerosols or particulates.
- These studies can be technologically challenging and require considerable time and effort.

- Furthermore, extrapolating results from a laboratory animal inhalation study to humans can be quite challenging, in part due to the differences in the anatomy of respiratory tracts of laboratory animals and humans.

Technologies that enable exposures of normal human respiratory cells in culture via the air-liquid interface hold considerable promise as non-animal alternatives for evaluating the potential of volatile chemicals, aerosols and particulates to cause effects within the respiratory tract.

- With the support of the [ACC LRI](#), scientists at [ScitoVation](#) have established a New Approach Method (NAM) testing protocol for evaluating respiratory tract toxicity using the Vitrocell 12/12 system for air-liquid interface (ALI) exposures. Methyl iodide was used as a prototypical point of contact lung toxicant for these studies.
- Comparisons were made of toxicity dose responses to methyl iodide in traditional submerged *in vitro* cultures using the 2D human-derived immortal cell line BEAS-2B to the EpiAirway™ human respiratory tract *in vitro* 3D cell cultures.
- The EpiAirway 3D culture is a composite of the different types of cells that are found in the normal tracheal/bronchial region of the respiratory tract in humans. This 3D cell culture system better recapitulates the morphology of *in vivo* bronchial epithelium than do submerged 2D culture systems.
- The results of this study show:
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  - The EpiAirway cultures “can reveal responses to chemicals that BEAS-2B cultures cannot.”
  - The similarity of the BEAS-2B and EpiAirway responses suggests that the BEAS-2B model could be used for preliminary range-finding studies or screening-level determinations.

[TSCA](#) now requires NAMs, such as these *in vitro* approaches to point-of-contact inhalation toxicity, in lieu of traditional animal toxicity tests when NAMs can provide information of equivalent or better scientific quality.

- This ACC LRI research project is contributing to the knowledge base needed to establish scientific confidence in such a NAM — which is necessary for applications in regulatory and product stewardship safety evaluations.

The ACC LRI has been at the forefront in catalyzing research to develop and apply NAMs for integrated, tiered testing approaches.

- View an example of this tiered IATA framework in the publication “[Developing context appropriate toxicity testing approaches using new alternative methods \(NAMs\)](#).”
- Visit the [ACC Research Catalog](#) to explore additional scientific publications of research supported by the ACC LRI.

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This Science Highlight was prepared by Richard A. Becker Ph.D. DABT of the ACC LRI. The views expressed are his alone.

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