

MITIGATION - SCIENCE AND TECHNOLOGY ADVANCES FOR CHEMICAL AND BIOLOGICAL HAZARD MITIGATION

Multiomeric Comparison Of Sulfur Mustard-exposed Human And Rat EpiAirway Tissues

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Translating cellular responses to chemical exposures at the in vitro level to the in vivo level is a challenge within the entire scientific community. This is especially difficult for chemical defense research due to the limited availability of exposure data in humans, as well as the difficulty in accumulating large amount of animal model exposure data. Recent advances in cell culture techniques have presented unique opportunities to evaluate effects of chemical warfare agents (CWAs) on human cells engineered to mimic complex three-dimensional (3D) tissue types in vitro, such as the respiratory tract, skin, liver, kidney, digestive tract, and brain. Recently, a respiratory tract model has been developed from rat primary airway epithelial cells (rat EpiAirwayTM). The development of these types of in vitro 3D models using cells from experimental animals allow for a more direct comparison to what is occurring in response to chemical injury in vivo. In this study, we compare the cellular responses of human EpiAirwayTM and rat EpiAirwayTM to sulfur mustard vapor exposure. We evaluate the cellular inflammatory signaling pathways associated with sulfur mustard exposure through both classical techniques (e.g. histopathology) as well as newly developed multiomics techniques (e.g. proteomics, metabolomics, lipidomics). These types of comparisons with cells derived from humans and experimental animals are necessary to aid in the translation of cell culture model exposure data to in vivo animal model exposure data.

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