Abstract

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Evaluating the Sub-Acute Toxicity of Formaldehyde Fumes in an In Vitro Human Airway Epithelial Tissue Model

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Abstract

Formaldehyde (FA) is an irritating, highly reactive aldehyde that is widely regarded as an asthmagen. In addition to its use in industrial applications and being a product of combustion reaction and endogenous metabolism, FDA-regulated products may contain FA or release FA fumes that present toxicity risks for both patients and healthcare workers. Exposure to airborne FA is associated with nasal neoplastic lesions in both animals and humans. It is classified as a Group 1 carcinogen by International Agency for Research on Cancer (IARC) based on the increased incidence of cancer in animals and a known human carcinogen in the Report on Carcinogens by National Toxicology Program (NTP). Herein, we systematically evaluated the tissue responses to FA fumes in an in vitro human air-liquid-interface (ALI) airway tissue model. Cultures were exposed at the air interface to 7.5, 15, and 30 ppm of FA fumes 4 h per day for 5 consecutive days. Exposure to 30 ppm of FA induced sustained oxidative stress, along with functional changes in ciliated and goblet cells as well as possible squamous differentiation. Furthermore, secretion of the proinflammatory cytokines, IL-1β, IL-2, IL-8, GM-CSF, TNF-a and IFN-γ, was induced by repeated exposures to FA fumes.

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Biography

Jifeng Yu completed his MD degree at the age of 22 from Henan Medical University, China. He is a distinguished professor and chief physician at the first Affiliated Hospital of Zhengzhou University, China. He has over 30 publications. He has contributed to 6th, 7th and 8th workshops of HLDA (Human Leukocytes Differentiation Antigens), particularly in antibody cross-examination and classification.