

Bronchiolitis Obliterans and Artificial Butter Flavoring

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Diacetyl (2, 3-butanedione) is a key ingredient in artificial butter flavoring that is used in dairy products, bakery goods, snack foods, and cooking oils. Diacetyl was granted GRAS (generally recognized as safe) status as a food ingredient, and consumption of the low levels of diacetyl present in food has not been shown to present a human health risk. The toxicity of inhaled diacetyl vapors was not a concern until a number of workers in a microwave popcorn packaging plant were diagnosed with bronchiolitis obliterans, a potentially fatal lung disease. Due, in part, to a lack of inhalation toxicity data for diacetyl, regulatory agencies were unable to set occupational exposure limits for worker protection. The Respiratory Toxicology group was tasked with generating diacetyl inhalation toxicity data in animals that could be used by regulatory agencies. As part of this work we are also investigating the mechanism(s) by which inhaled diacetyl causes bronchiolitis obliterans. Bronchiolitis obliterans is a significant clinical problem, most commonly associated with lung transplant rejection. The 5-year survival rates after lung transplant are the lowest among all solid organ transplant recipients due to the development of bronchiolitis obliterans. Despite the significant impact that bronchiolitis obliterans has on transplant patients and on workers with diacetyl-induced disease, little is known about the pathogenesis of this disease. Research has been limited by the lack of an adequate animal model of bronchiolitis obliterans, and as a result the mechanism(s) is unclear and there are no effective treatments for this condition. As part of our research on diacetyl, we developed an animal model of chemical-induced bronchiolitis obliterans and are using this model to investigate the pathogenesis of this disease.