PS **1506 AIRWAY EPITHELIAL TOXICITY OF THE FLAVORING AGENT, 2, 3-PENTANEDIONE.**

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Workers producing microwave popcorn are at increased risk for severe, fixed airways obstruction. Human disease correlates with exposure to diacetyl (2,3-butanedione), a 4-carbon, α-diketone component of butter itself and many butter flavorings. In rats, acute diacetyl inhalation damages epithelium in nose, trachea and large intrapulmonary airways, with the greatest damage in nose, an injury distribution explained in part by the pharmacokinetics of inhaled diacetyl. A 5-carbon α-diketone, 2,3-pentanedione, is also used as a flavoring. The acute respiratory toxicity of 2,3-pentanedione, was investigated in this study because of structural similarities to diacetyl. Male, Sprague-Dawley rats inhaled 0, 118, 241, 318 or 354 ppm 2,3-pentanedione for 6 hr, were sacrificed the next day, and nose, trachea, and lung were assessed by histopathology. Airway epithelial changes included degeneration, apoptosis, necrosis and neutrophilic inflammation, with nasal epithelium being most affected. As exposure concentration increased, epithelial damage and inflammation increased in severity and extended deeper into the respiratory tract, with necrosuppurative tracheitis present in all rats inhaling 354 ppm. Physical examinations suggested delayed onset of toxicity. To investigate potential delayed toxicity, additional rats were exposed to 318 ppm, 2,3-pentanedione and sacrificed immediately (<2 hr) or 1 day (18 – 20 hr) after exposure. In the 1st nasal section (T1), minimal to mild, epithelial cell degeneration, apoptosis and individual cell necrosis observed immediately after exposure progressed with time post-exposure, developing into moderate to marked, multifocal and coalescent, necrosuppurative rhinitis the following day. These findings indicate that inhaled 2,3-pentanedione, similar to diacetyl, injures airway epithelium in rats, predominantly in nose, but also affects deeper airways. In addition, clinical and histopathologic toxicity are delayed after 2,3-pentanedione inhalation.

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