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Toxicological assessment of the mainstream aerosol of a carbon heated tobacco product in Sprague-Dawley rats: A 90-day sub-chronic inhalation study

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CHTP (carbon heated tobacco product) 1.2 is a potential modified risk tobacco product in which the tobacco plug in a specially designed stick is heated to ≤ 300°C using a carbon heat source. The operating temperature is below the combustion temperature of tobacco, resulting in generation of aerosol with significant reduction of harmful and potentially harmful constituents compared with cigarette smoke. The toxicity of CHTP 1.2 was characterized in a 90-day sub-chronic inhalation study according to the OECD 413 testing guidelines. Sprague-Dawley rats were exposed for 6 hours per day, 5 days per week for at least 13 weeks to filtered air (control), mainstream smoke of reference cigarette 3R4F at 23 µg nicotine/L, or aerosol of CHTP 1.2 at three target concentrations of 15, 23 and 50 µg nicotine/L, respectively. Additional animals from control and CHTP 1.2 high exposed groups were included to observe reversibility of toxicity over a period of 42 days after the exposure. Reduction in respiratory minute volume and frequency typically observed in 3R4F-exposed group was less pronounced in animals breathing CHTP 1.2 aerosol. The number of inflammatory cells and levels of excreted pro-inflammatory cytokines in bronchoalveolar lavage fluid of animals exposed to CHTP 1.2 were lower than in the 3R4F-exposed group. Clinical pathological changes such as higher blood neutrophil counts, elevated liver enzymes and decrease of cholesterol and glucose levels were observed in 3R4F and lesser extent in CHTP 1.2 high groups, compared with control. Microscopic findings in respiratory tract organs including epithelial cell hyperplasia and squamous metaplasia were reduced in CHTP 1.2 as compared with 3R4F-exposed group. In summary, the results indicate that the inhalation of aerosol from CHTP 1.2 caused minor effects in rats mainly attributed to nicotine, and the effects on respiratory tract organs were much lower compared with those from 3R4F reference cigarette.

Biography

Initially trained as a cellular and molecular biologist, Blaine began his scientific career studying the potential of differentiated embryonic stem cells as cellular replacement therapies in a biotechnology start-up company. This led to a journey spanning 3 continents working in the pharmaceutical and the tobacco industries in research and development departments focusing on assay development and drug discovery, as well as inhalation toxicology.

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