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Method Development for Toxicity Screening with Exposure Route relevance: Initial Progress

Abstract *

Inhalation is an important route of exposure to particulates and there is increasing awareness of the need for bio-relevant exposure models, and validated toxicity endpoints that are unaffected by the presence of particulates. The aim of this study was to assess the potential effects of airflow in the twin stage impinger (TSI) and the next generation impactor (NGI) on the air liquid interface fluid in tissue culture models; and to select appropriate assays for future assessment of cellular response to deposited aerosol exposure.

Trans/snapwells with DMEM were placed into the deposition systems and a range of airflows and volumes passed through them. The weight before and after was recorded. Fluorescein salt solution was used in both systems and the remaining concentration was determined after the airflow. Titanium dioxide, Silicon carbide and DQ12 were suspended in DMEM complete media and tested using the MTT, MTS, WST-1 and Prestoblue assay to determine any interaction.

The evaporation and fluorescein studies showed that a high loss of DMEM and fluorescein occurred with the TSI at airflows above 30 L/min while the NGI showed minimal loss at all flow rates up to 90 L/min. No significant effect was observed in relation to the volume range (0.5-6L). The assay experiment showed the Prestoblue assay was the most suitable to use. Other assays were only suitable to use at doses of less than 600 µg/ml. The NGI may be a viable option for aerosol delivery, however, the impact of evaporation on cell health must be determined.

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