**Real-time measurement of mass deposition in electrostatic based air-liquid interface in vitro exposure system using quartz crystal microbalance**

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Air-liquid interface (ALI) based in vitro exposure systems are gaining interest in the field of aerosol science. Unlike submerged in vitro exposure, the ALI system doesn’t require particle processing i.e., particle collection and their subsequent resuspension in aqueous media, responsible for non-representative changes in the particle properties. In ALI, the particles are directly deposited from the aerosol phase onto the cells using some external force, including sedimentation, impaction, thermophoretic, and electrostatic deposition. Among all the ALI systems available, the system using an electrostatic field to deposit the particles from the air, flowing in parallel to the cells, is a more realistic representation of deposition in the lungs. One of the challenges in working with the electrostatic field-based ALI systems is getting a good estimation of particle mass deposition, which defines the delivered dose to cells. This study explores the efficiency of a Quartz Crystal Microbalance (QCM) system in estimating the real-time deposition of particle mass inside an electrostatic based ALI system. A fluorescein sodium dosimetry was used to determine the deposition pattern inside the wells of the six-well plate, placed inside the ALI chamber. It was also used to calibrate the QCM system. QCM headers were designed and fabricated for use in the ALI system. Three QCM system were used at a time, placed in three of the wells of a six-well plate. Based on salt deposition in one well and using deposition pattern data, depositions in three other wells were estimated, which later was compared to the actual readings from QCM crystals placed inside the same wells. The comparison between the expected mass deposition and actual deposition, as measured using QCM systems, yield a linear fit with the slope of 1.046+/-0.025. The good fit between estimated and expected deposition verify the efficiency of QCM systems in measuring real-time mass deposition.