AbstractID: 2854 Title: Evaluation of a micro-CT scanner applied to the characterization of pulmonary architecture in the rat

Purpose: With the rapid demographic shift towards urbanization worldwide, increasing numbers of children are exposed to ozone and particulate pollutants as a result of closer proximity to transportation corridors. To quantify the effect that ozone has on mammals, a rat-lung cast model was developed and micro-CT techniques were used to image the lung casts at high spatial resolution.

Method and Materials: A normal rat lung was characterized. At sacrifice, the trachea was cannulated, and a RTV silicone compound was injected by syringe into the airways and allowed to harden. The rat tissues were decomposed using acid bath, so that a cast of the respiratory tree of each rat remained. A custom designed micro-CT scanner was used to evaluate the lung casts. The system used a 70 micrometer focal spot tungsten anode, a rotating stage, and a 2048 x 1024 CMOS based indirect (Gd_2O_2S) detector.

Results: CT scans were acquired using the full resolution of the detector, and using between 300 and 1000 projection images. A cone beam reconstruction developed in house was used to generate high resolution volume data sets (eg. 1024 x 1024 x 512) of the lung casts.

Conclusion: The micro-CT scanner was able to accurately characterize the pulmonary structure of the rat from the lungs casts, and this approach was necessary to characterize the complex three dimensional pulmonary structures. This application of small animal imaging technology has enabled computer modeling and quantitative analysis of the biological issues surrounding ozone exposure using the rat model.

Conflict of Interest (only if applicable):