AbstractID: 9351 Title: Evaluating Ventilation Air Pressure for Mice Lung Imaging In-vivo

Until recently, assessing radiation damage to mouse lungs required sacrificing the animal. The development of a respiratory gated cone-beam micro-CT system, however, has significantly improved our capability to image the mouse thorax *in-vivo*. The images consist of isotropic voxels that are 90 μm X 90 μm X 90 μm, allowing the images to be viewed from any direction without resolution loss. The goal of this project was to determine the ideal ventilation air pressure to maximize image quality without over-inflation of the lungs. Ideal ventilation air pressure would fully inflate lung tissues without over distending airways. Six mice were anesthetized and intubated. A SAR–830/P small animal ventilator was connected to the endotracheal tube to control the lung inflation pressure. This ventilator produces an electronic trigger to initiate micro-CT data collection at a specific point in the respiration cycle. The effect of four different pressures (12, 14, 16 and 18 cm of water air pressure) on image quality were evaluated. Resulting images were qualitatively examined by two radiologists to assess image quality, including both over-inflation and under-inflation of the lungs. The lungs inflated with 14 cm revealed adequate inflation while 12 cm of water air pressure showed isolated areas of atelectasis. Lungs inflated with 16 cm and 18 cm of water air pressure had modest and marked distention of the airways, respectively. Our next study will include examination of mice with known lung tissue radiation damage to confirm that this imaging technique can demonstrate damage to mouse lung tissues *in-vivo*.