Abstract ID: 19080  Title: Characterization of Rotating Source MicroCT for Evaluating In Vivo Murine Trabecular Bone

Purpose: The objective of this study is to determine the optimal physical parameters of the Inveon Multi-modality microCT to assess the trabecular bone of mice.

Methods: The x-ray Source-to-Axis Distance is increased from 100mm to 183mm to 263mm. Similarly, combining local pixels, or binning, is examined from no binning to 2 to 4. Energy is varied from 40kVp to 80kVp in 10kVp increments and filter thickness is changed from no filtration to 1.5mmAl in 0.5mmAl increments. A lucite phantom with six different density-equivalent rods is used to measure changes in Hounsfield Units (HU) and calibrate Bone Mineral Density estimation. Mice are scanned at four different magnification and binning combinations to evaluate dose and microstructure changes of high to low resolution images.

Results: An increase in magnification and decrease in binning results in an effective pixel size ranging from 95µm to 9µm. This decreases the signal to noise ratio from 19.2 to 1.7HU and density estimation from 1585 to 1383mg/cc for 1250mg/cc equivalent material. Increasing the average energy of the radiation beam also decreases HU estimation from 1466HU to 1132HU. Higher resolution scans extend the scan time and absorbed dose from 5.1 to 13.4min and 3.9 to 125cGy respectively. An 18 micron pixel provides distinguishable trabecular bone surface from cortices with a 4.2HU signal to noise ratio.

Conclusions: A high magnification, binning of 2, 80kVp beam with a 0.5mmAl filter are the optimal parameters to evaluate the trabecular bone of mice for the Inveon MM microCT unit.

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