AbstractID: 13127 Title: Validation of In-air Micro-CT Measures of Excised Tumor Volume as Gold Standard for Tumor Size Response in Rodent Models

Purpose: The treatment efficacy of anticancer drugs is often assessed by measurement of tumor size change. Radiologic assessment of tumor size has been performed using one-dimensional measurement (RECIST), area calculated from two linear dimensions (WHO criteria), and volume calculated from two or three linear dimensions using a variety of equations or other volumetric techniques. However, one- and/or two-dimensional measurements may misrepresent change in tumor size by disregarding the second and/or third dimension. It is frequently proposed that the weight of an excised tumor is the most consistent and reproducible reflection of its volume. The aim of this project is to validate that *in-air* micro-CT imaging volume of an excised tumor can be gold standard in place of mass. **Methods and Materials:** Ultrasound, micro-CT and MR imaging of twenty head and neck rat tumor models (SCC-4) ranging in size from 4.19 mm^3 to 1436.76 mm^3 were performed followed by caliper measurements. Tumors excised from rats were weighed and *in-air* micro-CT images of the excised tumors were obtained. *In-air* micro-CT imaging volume of excised tumors was calculated using a voxel counting method of Analyze software. NIST-traceable acrylic phantoms were used to validate accuracy and precision of micro-CT imaging volume. *In situ* tumor size measurements were made in three perpendicular dimensions for each modality. 1D (RECIST), 2D (WHO) and 3D (volume) analysis was performed for each modality as well as the caliper method, and compared with excised tumor volume. **Results:** The accuracy (~ 0.4%) of *in-air* micro-CT imaging volume of excised tumors was confirmed using acrylic phantoms. *In situ* volumes in three modalities were linear to "gold standard" excised tumor volumes and showed statistically to be the most likely model. **Conclusion:** It is concluded that *in-air* micro-CT imaging volume of excised tumors is a more direct gold standard and nearly equivalent to mass.