AbstractID: 14525 Title: Physical Validation of PET/CT for imaging as a Biomarker

An expanding goal of quantitative medical imaging is it use by clinical investigators, cooperative cancer trial groups, and pharma in clinical trials of new cancer therapies. Quantitative measures of tracer uptake used in positron emission tomography (PET) imaging have been shown to be a predictor of patient outcome including pathologic response, disease-free survival and overall survival in single institution imaging and therapy trials. There is increasing interest in using PET as a biomarker to evaluate response to therapy and possibly as an endpoint for cancer therapeutic response in multi-center trials. However, several sources of variance and inherent in quantifying PET tracer uptake should understood and determined in order to ascertain the significance of differences in serial measurements and aid estimation of expected variances during clinical trial design. This has three distinct and linked components; (1) measuring and reducing the bias and variance of multi-center quantitative PET/CT imaging measurements, (2) devising optimal PET image analysis methods appropriate for quantitative PET/CT imaging in clinical trials, and (3) developing and testing guidelines for incorporating quantitative PET/CT imaging as a biomarker and measure of response in cancer clinical trial design. Underlying themes include optimizing the clinical and biologic data that can be gleaned from imaging in the setting of cancer therapy clinical trials, matching the design of the imaging components to the phase and complexity of the cancer clinical therapy trial, and matching the imaging approach to the type of tumor and the therapeutic agent.