



Application for QIBA Project Funding

Title of Proposal: Evaluation of FDG-PET SUV covariates, metrics, and response criteria		
QIBA Committee/Subgroup: Quantitative PET		
NIBIB Task Number(s) which this project addresses: 1, 3, 10		
Project Coordinator or Lead Investigator Information:		
Last Name: Yap	First Name: Jeffrey	Degree(s): PhD
e-mail:	Tel #:	
Institution/Company: Dana-Farber Cancer Institute / Harvard Medical School		
Amount Requested:		

Project Description:

We have developed a large database of more than 25,000 PET oncology studies, which includes critical acquisition parameters, patient information, and DICOM CT and PET images.¹ Many of these studies are from multi-center trials that included PET scanner qualification, phantom imaging, central review and PET SUV analysis, and collection of clinical outcome data. We propose to perform a retrospective meta-analysis to compare different PET metrics, response assessment criteria (EORTC, PERCIST), PET SUV covariates (FDG dose, glucose, fasting time, patient size, etc.), and clinical outcome. A small component of this activity has already been performed in a subset of data comparing the impact of metabolic response assessment using SUVmax vs. SUVmean (Figure 1) and SUV patient size normalization using lean body mass vs. body weight (Figure 2).^{2,3,4} The requested resources that are needed to complete this work include the compilation of images, meta-data, and clinical trial outcome measures from a research miniPACS archive, multiple clinical trial MS Access databases, a clinical PET database, and various sources of clinical trials results such as Excel spreadsheets. In addition to the existing results, additional image analyses will be performed to generate normal tissue ROIs (e.g. liver) as well as multiple tumor ROIs for studies that only included single tumor per patient in the original analysis. A software package will be developed in IDL to establish a DICOM server research archive and automatically extract and compare various PET metrics (e.g. SUVmax, SUVmean, SUVl_{bm}) from previously performed ROI analysis. This will address a major limitation in commercial software that only allows the use of a single metric and/or response criteria for a given study and facilitate the automated generation and comparison of different PET metrics and response criteria. Lastly statistical analysis will be performed on the results of multiple clinical trials in order to evaluate the impact of covariates, PET metrics, and response criteria on the performance of FDG-PET SUV as an imaging biomarker of therapeutic response. This will yield critical results for supporting claims in the QIBA profile with such as the variability in response assessment using different methods as well as justify consensus recommendations in the UPICT protocol, e.g. with regards to image analysis and response assessment.