Application for QIBA Project Funding

Title of Proposal: Reference Image Set for Quantitation Conformance of Algorithmic Lesion Characterization		
QIBA Committee/Subgroup: CT Volumetry BC		
NIBIB Task Number(s) which this project addresses:		
Project Coordinator or Lead Investigator Information:		
Last Name: Samei	First Name: Ehsan	Degree(s): PhD
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Institution/Company: Duke University Medical Center		
Amount Requested:		

Project Description

Our ability to accurately characterize a lesion is fundamentally limited by the varying confluence of anatomical background surrounding the lesion. As such, simplistic phantoms based on uniform or fixed constructs have limited relevance to clinical conditions in quantifying a varying lesion. Trials based on actual clinical images are in a sense ideal, but they also suffer from a lack of ground truth: it is nearly impossible to fully know the true size and morphology of a lesion in vivo, as subsequent pathological validations are rare, and even if done, the lesion can be deformed in the resection process.

The objective of the present project is to create and to make publicly available an image dataset of clinical CT scans with inserted synthetic, realistic lesions. The dataset provides anatomical variability as exists in actual clinical datasets, while at the same time the synthetic nature of the lesions offers the advantage of known truth. Multiple datasets can potentially be rendered as varying lesions can be reinserted countless times at various locations, thus "refreshing" the test set. The lesions can be multiplied into additional clones with statistical variability yet share the same generalized properties as those of the modeled lesions.

The deliverables for the project are 1) a (static) reference database of 100 hybrid clinical image sets with lung nodules, 2) a (static) reference database of 100 hybrid clinical image sets with liver lesions, both data sets with confirmed and validated added lesions for gold-standard quantitative evaluation, and 3) a software tool for (dynamic) lesion addition and database creation upon demand.