

AbstractID: 11655 Title: An optimized Protocol for using Small Field MV Cone-Beam CT Imaging in Image-Guided Radiotherapy (IGRT)

**Purpose:** The aim of this study was to develop an optimal protocol for imaging different body sites in patients during MV Cone Beam CT (MVCBCT) based IGRT for small field of view (FOV) imaging for Stereotactic Radiosurgery and other applications.

**Methods and Materials:** Clinically delivered MVCBCT imaging systems have built-in protocols that are optimized for large FOV imaging. For our protocol optimization study, we chose a field size of 12cm x 10cm to acquire CBCT images. Our study was conducted using our Siemens Oncor Impression Linac, an image quality phantom, an offline reconstruction tool prototype software, a prototype visualization tool, a dicom image extractor tool, and the ImageJ open source software from NIH. Five regions of the image quality phantom were imaged and the raw data was processed using the offline reconstruction tool by changing various reconstruction parameters. Our study was focused on two specific regions of the phantom, corresponding to electron densities of 9% and 17%. A useful projection image size of 448 x 373 pixels on the flat panel detector was used for the filtered backprojection. The dicom images were extracted with the dicom extractor from the reconstructed images for post processing and quantitative image analysis using the ImageJ software.

**Results:** Our efforts in optimizing the image reconstruction and processing chain resulted in the development of protocols that result in superior images. We have developed quantitative methods to analyze the results and determine the optimal protocol. We are currently repeating the imaging process with the Image Quality phantom to check for reproducibility of our methods and protocols.

**Conclusions:** Our preliminary result provides a valuable reference to setup an optimal protocol for using small field MVCBCT for IGRT. Once we confirm the reproducibility of our protocol, we plan on imaging a series of patients to clinically test the protocol.