AbstractID: 6527 Title: Optimal CT Imaging Protocol settings for CT Simulators

Purpose: It is the expectation of CT simulations to get the best CT images with free breathing scans. CT imaging protocol settings needed to achieve optimal image quality have been identified for every scanner in a Radiation Oncology Department having various makes and models of CT simulators.

Method and Materials: A Catphan® phantom was used to evaluate the image quality of 5 different makes/models. Various pitch, detector configuration, and gantry speed parameters were studied, while maintaining constant kVp, effective mAs, head display field of view (DFOV), reconstruction filter, and image thickness settings. Three aspects of image quality were evaluated: 1) helical artifact presence, 2) high contrast resolution, and 3) low contrast resolution.

Results: For all CTs, more artifacts appear when the channel width is equal to the image thickness. Less helical artifacts are present if the channel width is half or less of the image thickness. At these settings, however, artifacts are still present in varying degrees depending on pitch. For a 16-channel CT of one manufacturer, the artifact-free pitch setting is 1.4 or less, but for their 16-channel large bore CT, it is 0.9 or less. For another manufacturer's 16-channel CT, the channel width has to be 1/4 of the image thickness with a pitch of 0.6 to obtain artifact-free images. The optimal settings for all scanners are different. Only slight differences in high and low contrast resolution are observed, even at varying gantry rotation speeds; these differences seem insignificant at body DFOV (clinical setting).

Conclusions: In order to obtain optimal CT image settings, a study should be conducted for each CT model, for there is a vast difference in optimal settings among them. Faster rotation gantry speed should be used as possible, for reduced motion artifact is expected for patient free-breathing scans.