

Purpose: Megavoltage image scanning on Tomotherapy is an important process in Image-Guided Radiation Therapy. It provides the patients alignment as well the delineations of organs at risk where dose needs to be limited. However, radiation dose delivered to the patient from imaging process needs to be addressed and integrated as part of the radiation dose to the tumor and OAR's. This study is to provide the tool to evaluate the additional dose which contributed to the patient from the image requisition.

Methods: Several sets of dose measurement were obtained from two cylindrical acrylic phantoms with different diameters which represent head and body respectively. The phantom images were scanned using diagnostic CT and transferred to Tomotherapy. CTDI in AAPM TG-111 report was applied to report the dose. The 100-mm long stem detector used in the measurements collects the scattered dose in the phantom. The long stem collecting volume is counting for the dose equilibrium within the geometry.

Results: Average readings of several scans for each phantom were obtained. The smaller (head) phantom scans has higher average dose than body scan and the peripheral doses were greater than the central dose by a factor of 1.5 consistently. The well known CT prodigy has been observed that for the dose will increase as the object being scanned with smaller size. In clinical aspect, for a typical patient who is undergoing cranial/brain Tomotherapy radiosurgery protocol, there will be another 11.3cGy will be delivered to the patient and this data is available to physician for his references.

Conclusions: Tomotherapy does provide IGRT technique for patients to receive the prescribed dose to the tumor and spare the OAR within the tolerances. However the imaging behavior should be evaluated with CT dose index to provide clinicians with comprehensive evaluation in radiotherapy.