AbstractID: 9314 Title: Fast, Low-Dose Patient Localization on TomoTherapy via Topogram Registration

Purpose: We present a protocol to efficiently localize patients on TomoTherapy by using a scout imaging (topogram) mode that can be used instead of or in conjunction with 3D MVCT imaging. **Method and Materials:** To show the feasibility of this method, we scanned anthropomorphic head, thorax, and pelvis phantoms on a kilovoltage CT simulator and subsequently generated digitally reconstructed topograms (DRTs) in the native geometry of the TomoTherapy source/imaging array. The same phantoms were scanned in the imaging mode of the TomoTherapy unit with a moving couch and *fixed* gantry of 0° and 270°. The raw detector data were read out at the end of these respective "anterior-posterior" and "right-lateral" scans, which in turn were compared against DRTs to evaluate the ability of computing shifts and rotations using these images. **Results:** Using the helical MVCT beam parameters, the time needed to acquire a quality topogram was 12.5 sec for a 50 cm long field. The minimum acquisition time was limited by the maximum couch speed of 4.0 cm/sec. The topogram dose was <1% of that incurred by a MVCT scan. **Conclusions:** Using topogram images may dramatically reduce the time required to localize the patient for treatment sites that require only bony anatomy imaging. Topograms can be used alternately with MVCT imaging for cases where topograms are useful for positioning, while MVCT is used for monitoring soft tissue response. Where topograms alone can suffice, our protocol boasts a 30-fold reduction in time and 100-fold reduction in dose to standard MVCT patient localization.

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