AbstractID: 9580 Title: Impact of CT number in radiation treatment planning

Advances in dose calculation with Monte Carlo simulation, collapsed cone convolution and pencil beam have added a new confidence in radiation treatment planning and have become vital for accurate inverse planning used in intensity modulated therapy. These algorithms require CT data of a patient to generate the electron density for dose calculation. However, the CT number is dependent on various parameters such as kilovoltage, field of view (FOV) and reconstruction algorithm (vendor specific). Additionally, the electron density versus CT number table is specific to Treatment Planning Systems (TPS) and multiple tables are often not allowed. The effect on dose calculations of CT number, acquired under different conditions. A CT phantom with known electron density plugs was scanned on several scanners from 80 kVp to 140kVp with full and half FOV and used for treatment planning with inhomogeneity correction on Helax TPS. Results show that CT numbers do vary significantly with scanners, FOV and more importantly on the kilovoltage. The differences in CT numbers are more pronounced for high density materials. The CT number variations are minimal for soft tissue and lower density materials with different parameters and hence dosimetry is nearly unaffected in thoracic region. For pelvic irradiation with beams passing through hip, the dosimetric effect was linearly dependent on kV and the magnitude was in the range of 3-4%. It is concluded that a single electron density table can be used for all inhomogeneity correction within ±2% where CT values are achievable except high-Z prosthesis.