AbstractID: 13698 Title: Study of the dose distributions in serial and helical Tomotherapy for CO-60, 6MV and 10MV beams using PENELOPE Monte Carlo

Purpose: Study the dose distributions for ^{60}Co, 6MV and 10MV beams in tomotherapy through PENELOPE Monte Carlo code. **Methods and materials:** PENELOPE was modified to simulate beam movement like used in serial and helical tomotherapy technique. The dose distributions in tomotherapy were simulated with a cylindrical phantom of 5 cm radius and 10 cm length. To simulate serial tomotherapy, the slice was obtained in 1 degree intervals until complete 360 degrees. A superposition software was developed in MatLab to obtain multi slices. To simulate the helical movement of the beam, relative to phantom length, for each rotation of 1 degree, the beam was displaced 0.00125 cm longitudinally. The SADs were 80 cm, 100 cm and 100 cm respectively to each beam, with a no modulate field of 1 x 1 cm^2. To evaluate the simulated dose distributions the conformity index and Dose-Volume Histograms (DVH) were used. A cylindrical Planned Target Volume of 0.2 cm radius and 2.2 cm length and an adjacent cylindrical ring organ-at-risk of 0.2 cm internal radius, 0.5 cm external radius and 4.4 cm length were defined inside the phantom. **Results:** The obtained conformity indexes were 0.78, 0.85 and 1 to serial tomotherapy and 0.67, 0.98 and 0.98 to helical tomotherapy to ^{60}Co, 6MV and 10MV, respectively. **Conclusions:** In the serial tomotherapy ^{60}Co and 6MV have shown similar behavior and have spared health tissues better than 10MV. To helical tomotherapy 6MV and 10MV have shown similar behavior but ^{60}Co has shown a better sparing of health tissues while losing dose conformity. Helical tomotherapy conformed the dose in target volume better than serial tomotherapy, without hotspots.