AbstractID: 13480 Title: Evaluation of genipin gel dosimeter for depth dose measurement of x-ray beams

Purpose: To evaluate genipin gel dosimeter for depth dose measurement of x-ray beams.

Method and Materials: Differences in depth doses between the genipin gel dosimeter and water for clinical megavoltage and kilovoltage x-ray beams was determined using Monte Carlo modeling. All the Monte Carlo calculations were performed using the EGSnrc/BEAMnrc package (V4 r2-2-5). The clinical x-ray beams were generated from a Varian 21iXs linear accelerator generating 6MV x-rays and a Pantak Therapax DXT300 kilovoltage x-ray unit with a tube potentials from 50 to 280kVp. A higher energy kilovoltage x-ray beam was also calculated by increasing the maximum energy of incident electron energy hitting the target to 350keV. The BEAMnrc user code was used to calculate the phase space files for each of the x-ray beams. The generated phase space files by BEAMnrc were then used to calculate depth dose curves for the genipin gel dosimeter and water using the DOSXYZnrc user code. The dose in each phantom was defined as $60\times60\text{cm}^2$ for 6MV and $20\times20\text{cm}^2$ for kilovoltage energies in the lateral planes while along the depth direction, smaller voxel sizes (Minimum voxel thickness of 0.25cm for 6MV and 0.5cm for kilovoltage energies) were used in the dose buildup region.

Results: For the calculated depth dose using the 6MV x-ray beam, there were differences of less than 1% between the genipin gel dosimeter and water. For the kilovoltage energies, the relative difference in the depth doses of the genipin gel dosimeter and water is approximately 2% for the 50 and 75kVp photon beams, 1% for the 100 and 125kVp photon beams, 0.5% for 180 and 200kVp photon beams and less than 0.1% for 250-350kVp photon beams.

Conclusion: According to this result, genipin gel dosimeter is a water equivalent dosimeter for depth dose measurement of the clinical 6MV and kilovoltage photon beams.