AbstractID: 7536 Title: Linear Energy Transfer (LET) dependence of BANG® polymer gel dosimeters in proton beams

Purpose:
Technological advances of radiation therapy delivery systems, like proton therapy, have prompted research towards the development of accurate and reliable 3D dose verification systems, such as polymer gel dosimetry. Furthermore, preliminary research has shown a decrease in gel dosimeter response in high LET regions of a dose distribution. The aim of this study is to assess the response of BANG® polymer gel dosimeters in proton beams.

Method and Materials:
Dose response curves were first obtained for a range of doses of 6 MV x-rays and 250 MeV protons by irradiating BANG® gel dosimeters immersed in a water phantom. The plateau region of the proton beam was used. The gels were then scanned using Optical CT (OCT) and ion chamber measurements for the proton and photon beams were collected. Next, several BANG® gels were irradiated in the peak of a 140 MeV pristine proton beam to acquire the depth dose distribution. OCT scans of the gels were compared with ion chamber percent depth dose data to determine and correct for the relative sensitivity of the gel dosimeter at various depths.

Results:
BANG® gel dosimeters showed a linear response with dose of optical attenuation acquired with the OCT scanner for both proton and photon beams in the range 0 Gy to 6 Gy. The relative sensitivity of the gel dosimeters at various depths in a 140 MeV proton beam showed an 8% underdose in the Bragg peak region. Additional energies will be investigated.

Conclusion:
BANG® polymer gel dosimeters can be utilized to assess the three-dimensional character of the resultant dose distributions in proton beams. Further research includes irradiating the RPC pelvis phantom to evaluate the radiation treatment plan calculations.

Conflict of Interest (only if applicable):
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