AbstractID: 13304 Title: The effects on parameters of Bragg peak curve by inhomogeneities location

Purpose: To describe the effect on the Bragg peak curve by inhomogeneous materials placed in entrance Plateau and Bragg peak region, respectively. **Method and Materials:** We evaluated Bragg peak position, range, penumbra and doses by using the Geant4, version4.9.02, simulation toolkit. The bone and adipose tissue were inserted in entrance Plateau and Bragg peak region. Positions of inhomogeneities were selected about proximal 36% (entrance region of Plateau) and 50% (entrance region of Bragg peak) point of maximum dose. The thickness of each material was varied with range from 0.1 and 1.0 cm. And also the initial energy of proton beams was changed from 108 MeV to 220 MeV with an order of 30 MeV. Physics models of Geant4 consist of electro-magnetic process and nuclear process. The electro-magnetic model bases on the ICRU49 and nuclear process was applied by the theory-driven G4PreCompound model. **Results:** The dose perturbation was shown in Bragg peak and inhomogeneous material regions concerning the location of inhomogeneities. There were, especially, a great differences when material of high density was inserted within homogeneous structure. However, there were not significantly variations of other evaluated parameters concerned with inserted location of each material. **Conclusion:** Effects of location of inhomogeneous material were principally shown to the dose variation. Our study suggests that the location of heterogeneous materials mainly affects dose variation when material of high density is inserted within homogeneous structure. These highlight the need for accurate location relations between materials with high density and target within treatment path.