Purpose: An existing nuclear interaction cross-section of a positron emitter was used to predict range accuracy of proton beams and cross section of the positron emitters detected by the PET scanner.

Methods: To achieve this goal, a MLIC phantom was irradiated to 2Gy dose using 124.61MeV, 143.08MeV and 155.25MeV proton beam corresponding to the depths of 6.88cm, 10cm and 16cm, respectively, in the phantom. The activity produced in each phantom was examined by PET scanner within a couple of minutes post-irradiation. Hence, activity signal produced along the activated depth dose profile was recorded. In this project, the isotope production cross section for carbon from Landolt-Bornstein (1973) has been utilized.

Results: A good correlation (about 95%) between the positron emission and the isotope cross section of the carbon was observed. Consistency between the induced activity and the carbon isotope cross section occurred mainly at the distal aspect of the fall off zone of both relative cross-sections (i.e. between 60 - 100%). These results were obtained using the high relative abundance of carbon (i.e. 70%) in the phantoms.

Conclusions: The ranges measured by the depth dose profiles and positron emission profiles were in good agreement at the distal-fall off edge. Furthermore, it is confirmed that the interaction cross-sections of individual elements in the tissues could be used to determine the range accuracy of the proton depth dose profiles.

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None Applicable