

Experimental Evidence of a Wall Effect in Proton Beam Ionization Chamber Measurements

Protocols for Ion Chamber (IC) calibration of Proton Therapy Beams do not take into account perturbation effects from the chamber wall. Several authors have proposed that secondary electrons from the wall of an IC would make an appreciable contribution to the total signal and that this contribution may be energy and material dependent. A recent publication predicts the magnitude of these effects for a variety of materials. (Casnati, *et al*) We have taken proton depth dose data in an approximately 150 MeV proton beam with two ICs that were geometrically identical but were made of different material. The mass of gas contained in the chambers constructed of A150 tissue equivalent plastic and C552 air equivalent plastic, calculated following TG21, differed by less than 1 part in 5000. Our data show an approximately 2% difference in the ratio of the signals in the Bragg Peak and plateau region. The C552 chamber accumulates approximately 1% less signal at low energies and approximately 1% more signal at high energies when compared to the A150 chamber. This is approximately the same magnitude of the signal perturbation predicted by Casnati, *et al* but is in the opposite direction. These data have direct implications on the total uncertainty of measured absorbed dose in proton beams following current protocols. Reference Casnati, *et al*, Phys Med Biol, 43,3 1998, 547-558.