AbstractID: 1519 Title: Diode is not a good dosimeter for measuring depth dose curves of clinical electron beams

The following five factors cause significant changes in the sensitivity of diode dosimeters (charge per absorbed radiation dose to water) during depth dose scans: (i) electron energy, (ii) dose rate, (iii) dose per pulse, (iv) photon/electron dose component, and (v) electron scattering angle (directional response). With increasing scanning depth, the first three factors decrease the diode sensitivity by up to 6% while the last two increases the sensitivity by up to 14% (Fig.1). These changes would have to cancel out each other perfectly at all depth to produce true depth dose curves. We present our diode data, which do not reproduce depth dose obtained with the NACP chamber in buildup and low percentage regions. Diode/NACP ratios of up to 1.30 were observed for some electron beams in the low dose region. At 50% dose level, the R_{50} (AAPM TG-51 definition) values determined with the diode are consistently higher (from 0.9 to 1.4 mm) than those determined with the NACP chamber. This would affect the implementation of TG-51. We also found that the ratio between the percentage readings from two diodes of the same type differed from unity by 5% to 15% in the low dose regions. Therefore, we conclude that the diodes of this study and some other diodes cited in Fig.1 are not a good dosimeter for measuring depth dose curves of clinical electron beams because numerous complex correction factors would have to be derived for their implementation based on measurements and Monte Carlo simulations.