AbstractID: 13318 Title: Monte-Carlo-based cavity correction factors for ion chambers in clinical electron beams

Purpose: To calculate the cavity correction factor, P_{cav}, at various depths for cylindrical chambers and plane-parallel chambers, NACP-02 and ROOS, in high-energy electron beams by means of the EGSnrc/Cavity code. **Method and Materials:** The chamber cavity was simulated in detail by the EGSnrc/Cavity code. P_{cav} was calculated at various depths which include a reference depth, d_{ref}, and a half-value depth, R_{50}, for 6, 9, 15, and 18 MeV electron beams. The effective point of the calculation was at a point shifted 0.5r upstream from the cavity center for cylindrical chambers and was the front face of the cavity for plane-parallel chambers. P_{cav} for the cylindrical chamber cavities were calculated with combinations of the diameters of 2, 4, and 6 mm and the lengths of 5, 10, and 20 mm. The results were compared with the values recommended by TRS-398 and other published data. **Results:** P_{cav} values increased as a function of a depth. Especially, the P_{cav} values at d_{ref} for cylindrical chambers were 4-10% higher than those at R_{50} in 6 MeV. P_{cav} values were lower with increasing the cavity diameter and decreasing the cavity length. This is because the lateral scattered electrons entering into the chamber cavity from the surrounding water increase. The effect is significant in lower-energy beams. Similarly, the P_{cav} values are 0.993 at d_{ref} and 1.030 at R_{50} for NACP-02 and 1.001 and 1.030 for ROOS in 6 MeV. P_{cav} for NACP-02 varies depending on depths (electron mean energy). The variation in P_{cav} for ROOS values is smaller than NACP-02 because its guard-ring is larger. **Conclusion:** The calculated P_{cav} value was sufficiently different from TRS-398 data. The P_{cav} values vary depending on electron mean energy and the chamber cavity size. For plan-parallel chambers, the sufficient guard-ring width needs to decrease the cavity correction.