AbstractID: 8146 Title: Monte Carlo calculations of correction factors for plane-parallel ionization chambers in clinical electron dosimetry

Purpose: To calculate the wall correction factor, P_{wall} and the replacement correction factor P_{repl} for NACP-02, Markus, and Roos plane-parallel chambers in clinical electron dosimetry using the EGSnrc Monte Carlo code system. **Method and Materials:** P_{wall} was calculated as the ratio of the dose to the sensitive volume of the air cavity in a chamber wall composed entirely of water to that in a real chamber wall. P_{repl} was obtained with dividing the ratio of the dose to water at the point of measurement (0.1 mm thickness) to the dose of sensitive volume of the air cavity by the stopping-power ratios. **Results:** P_{wall} for NACP-02 increased from 1.005 to 1.136 for 4 MeV and from 1.007 to 1.023 for 18 MeV, at a depth between near-surface to R_{50}. Similarly, P_{wall} increased from 1.004 to 1.079 and from 1.002 to 1.023 for Markus, and from 1.001 to 1.079 and from 1.004 to 1.023 for Roos. P_{wall} at a reference depth, d_{ref}, decreased from 1.019 to 1.008 for NACP-02, from 1.019 to 1.005 for Markus, and from 1.015 to 1.006 for Roos, in a range of 4 MeV to 18 MeV. Also, P_{repl} for NACP-02 increased from 0.973 to 1.079 for 4 MeV and from 0.996 to 1.017 for 18 MeV, at a depth between near-surface to R_{50}. Similarly, the P_{repl} values increased from 0.938 to 1.172 and from 0.992 to 1.022 for Markus, and from 0.982 to 1.055 and from 1.000 to 1.010 for Roos. P_{repl} at d_{ref} for NACP-02 and Roos was 0.999±0.3% and 1.000±0.3%, respectively, in a range of 4 MeV to 18 MeV. P_{repl} for Markus varied from 0.987 to 0.995 because of a narrow guard ring width. **Conclusion:** This study indicated the need for the change to P_{wall} and P_{repl} values used in current dosimetry protocols.