

Purpose: To analyze the long-term stability of Farmer-type cylindrical ionization chambers using the calibration factor provided by the KFDA (Korea Food and Drug Administration). KFDA is the national secondary standard laboratory (SSDL) in Korea and approve as a member of the IAEA SSDL network.

Materials and Methods: The cylindrical ionization chambers used in this study include PTW 30001(30006), 30013, 30002, 30004, 23333, Capintec PR06C, NE 2571, Exradin A12 and Wellhofer FC65G(IC70). The N_k and N_{D,W} calibration factors for the cylindrical chambers were analyzed and the measured N_{D,W} was compared with the calculated N_{D,W} calibration factor.

Results: The long-term stability of PTW 30013(30006), Wellhofer FC65G(IC70) and NE 2571 varied within 0.2 %, meaning that they are more stable than other ionization chambers. This result is different from previous ones showing that the long term stability of ionization chambers with graphite wall material was superior to ionization chambers made of PMMA material. It turns out that almost the same levels of the stability of calibration factor were shown between PTW 30013(30006) ionization chamber made of PMMA wall material and Wellhofer FC65G(IC70) ionization chambers made of graphite material, and thus the former is shown to be superior from the aspect of long-term safety, and PMMA wall material is firmer, more convenient to use, and it is more effective from the financial aspect. Therefore, it may be considered to be more appropriate to use for the regular dose measurements in comparison with graphite type ionization chamber. The measured N_{D,W} calibration factor was approximately 1.0% higher than the calculated N_{D,W} that was determined using the N_k calibration factor.

Conclusion: The long-term stability of the cylindrical chambers was evaluated using the N_k and N_{D,W} calibration factor. It should help to improve clinical electron dosimetry in radiotherapy.