The energy dependence of the response of a patient dose calibrator

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NOTE

Abstract

Kerma-area product (KAP) meters used for patient exposure monitoring in diagnostic x-ray imaging can be calibrated *in situ* with a reference KAP meter. The drawback of this tandem calibration method is the large energy dependence of the response of the reference KAP meter when typical KAP ionization chambers are used for this purpose. The energy dependence of a novel, large-area KAP meter (patient dose calibrator, PDC, Radcal) was therefore experimentally investigated. Its response was examined by measuring the calibration coefficients for standard calibration radiation qualities and several radiation qualities in the range generally used in diagnostic x-ray imaging. The PDC type of KAP meter has a smaller energy dependence than conventional KAP meters, and the half-value layer can be used as a radiation quality specifier for PDC-type chambers with an uncertainty of less than 2%. The accuracy of the tandem calibration method can be improved by using this type of KAP meter as a reference meter.

General scientific summary. Kerma-area product (KAP) meters used for patient exposure monitoring in diagnostic x-ray imaging can be calibrated *in situ* with a reference KAP meter. The drawback of this tandem calibration method is the large energy dependence of the response of the reference KAP meter when typical KAP ionization chambers are used for this purpose. The energy dependence of a novel, large-area KAP meter (patient dose calibrator, PDC, Radcal) was therefore investigated. Its response was examined by measuring the calibration coefficients for standard calibration radiation qualities and radiation qualities in range generally used in diagnostic x-ray imaging. The PDC type of KAP meter has a smaller energy dependence than conventional KAP meters and the HVL can be used as a radiation quality specifier with an uncertainty of less than 2%. The accuracy of the tandem calibration method can be improved by using this type of KAP meter as a reference meter.