Purpose:The purpose of this study was to estimate skin dose from real-time X-ray fluoroscopy imaging to do clinical trials for real-time tumor irradiation in MHI-TM2000 system (Vero).
Methods:First, exposure dose with backscatter was measured using a single set of kilovoltage X-ray tube and a flat panel detector; a cylindrical ionization chamber (DC300, IBA); and a water-equivalent plate phantom. The chamber was rigidly attached on the plate phantom of 200 mm in thickness. Then, the chamber was positioned to 150 mm upper from the isocenter. Subsequently, exposure dose to an irradiation field of 171 mm x 226 mm was measured at a speed of 5 fps with 200 mA of the X-ray tube current; and 40~120 kVp of the X-ray tube voltage, respectively. The nominal exposure time was set to 5 ms.
Next, half-value layer of aluminum was measured using a spherical ionization chamber (A4, Exradin) to calculate the effective energy and absorbed dose conversion factors of soft tissue. Then, the skin dose was calculated from the exposure dose and absorbed dose conversion factors.
Results:There were good liner correlations between the X-ray tube current and skin doses; and therefore, estimated skin dose from the X-ray fluoroscopy with 1 mAs and 100 kV was 140 μGy. Furthermore, estimated skin dose for one successive minute exposure at a speed of 5 fps with 0.1 mAs and 100 kV was 4 mGy. The skin doses in the MHI-TM2000 were greater by a factor of 1.4~1.6 than those in Elekta Synergy system with the tube voltage of 100 or 120 kV.
Conclusions:We have observed that the skin dose is a little larger than in the Synergy system while the filtration to the X-ray source has not been applied to the MHI-TM2000. To perform real-time tumor tracking, further investigation may be required.

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