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Occupational radiation dose associated with Rb-82 myocardial perfusion positron emission tomography imaging.

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Abstract

BACKGROUND: We determined staff radiation dose during rest and stress rubidium 82 myocardial perfusion positron emission tomography (PET) imaging.

METHODS AND RESULTS: Patients received 1,587 +/- 163 MBq (42.9 +/- 4.4 mCi) Rb-82 during rest or pharmacologic stress. A pressurized ion chamber was used to monitor radiation exposure in 50 examinations. For comparison, staff exposure during pharmacologic stress in 20 other patients receiving 1,204 +/- 55.5 MBq (32.54 +/- 1.5 mCi) technetium 99m 2-methoxy isobutyl isonitrile (MIBI) was measured. For Rb-82 infusion and PET acquisition, the mean dose was 0.45 +/- 0.25 microSv (0.045 +/- 0.025 mrem). Exposure for routine stress testing at variable distances from the patient was equivalent to background. Similar exposure for pharmacologic stress testing through 7 minutes after injection of Tc-99m MIBI at variable distances was 1.075 +/- 0.32 microSv (0.108 +/- 0.03 mrem). However, exposure for stress tests starting 7 minutes after Rb-82 infusion at 0.5 m was estimated at 0.4 microSv (0.04 mrem). To determine the potential radiation dose for those responding to a medical emergency or otherwise in close proximity to a patient, we measured the mean cumulative dose at 0.5 m from 0 to 7 minutes of Rb-82 infusion, which resulted in 19.1 +/- 5.8 microSv (1.9 +/- 0.58 mrem).

CONCLUSIONS: Radiation doses for all tasks during routine Rb-82 stress-rest PET are lower than measured Tc-99m MIBI values. However, the radiation dose in close proximity to the patient during or immediately after Rb-82 infusion can be considerably higher, underscoring the need for strict attention to source distance and contact times.

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