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Radiation dosimetry of 82Rb in humans under pharmacologic stress.

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Abstract

(82)Rb is used with PET for cardiac perfusion studies. Using human biokinetic measurements, in vivo, we recently reported on the resting-state **dosimetry** of this agent. The objective of this study was to obtain (82)Rb dose estimates **under stress**.

METHODS: (82)Rb biokinetics were obtained in 10 healthy volunteers (5 male, 5 female; mean age ± SD, 33 ± 10 y; age range, 18-50 y) using whole-body PET/CT. The 76-s half-life of (82)Rb and the corresponding need for **pharmacologic** vasodilation require that all imaging be completed within 10 min. To accommodate these constraints, while acquiring the data needed for **dosimetry** we used the following protocol. First, a whole-body attenuation correction CT scan was obtained. Then, a series of 3 whole-body PET scans was acquired after a single infusion of 1.53 ± 0.12 GBq of (82)Rb at rest. Four minutes after the infusion of a 0.56 mg/kg dose of the vasodilator, dipyridamole, 3 serial whole-body PET scans were acquired after a single infusion of 1.50 ± 0.16 GBq of (82)Rb **under stress**. The time-integrated activity coefficient (TIAC) for **stress** was obtained by scaling the mean rest TIAC obtained from our previous rest study by the **stress**-to-rest TIAC ratio obtained from the rest-**stress** measurements described in this report.

RESULTS: The highest mean organ-absorbed doses **under stress** were as follows: heart wall, 5.1, kidneys, 5.0, lungs, 2.8, and pancreas, 2.4 μGy/MBq (19, 19, 10.4, and 8.9 mrad/mCi, respectively). The mean effective doses **under stress** were 1.14 ± 0.10 and 1.28 ± 0.10 μSv/MBq using the tissue-weighting factors of the International Commission on Radiological Protection, publications 60 and 103, respectively.

CONCLUSION: Appreciable differences in source-organ biokinetics were observed for heart wall and kidneys during **stress** when compared with the previously reported rest study. The organ receiving the highest dose during **stress** was the heart wall. The mean effective dose calculated during **stress** was not significantly different from that obtained at rest.

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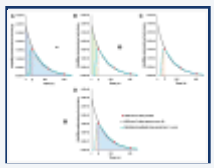
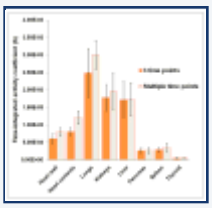
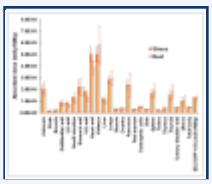

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