Biodistribution and radiation dosimetry of [99mTc]Tc-N4-BTG: Initial experience

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Abstract

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Introduction: In patients with prostate cancer (PC), imaging with gastrin releasing peptide receptor (GRPR) ligands may be considered as an alternative to PSMA-targeted tracers, especially in cases of low Gleason score and low PSMA expression. Tc-99m-BTG-N4 is a newly developed GRPR-targeted probe for SPECT imaging. The current analysis will evaluate safety, biodistribution and dosimetry of [99mTc]Tc-N4-BTG in patients with biochemical PC recurrence.

Methods: Four patients (mean age: 65 years) with a history of PC underwent imaging administering 772 ± 74 MBq (range, 683 - 836 MBq) of [99mTc]Tc-N4-BTG. Planar whole-body images were acquired at 5, 30, 60, 120 and 240 min post injection. SPECT/CT was performed at 60, 120 and 240 min post injection. Time-dependent changes of the injected activity per organ were determined. Mean organ-absorbed doses and effective doses were calculated using OLINDA/EXM 1.0.

Results: The injection of a standard activity [99mTc]Tc-N4-BTG resulted in an effective dose of 1.16 ± 0.10 µSv/MBq. The pancreas was the critical normal organ with the highest mean absorbed dose of 3.5 ± 1.2 µGy/MBq, which is noticeably lower than currently applied GRPR-targeted compounds, such as [68Ga]Ga-RM2 (124 ± 63 µSv/MBq) [1], followed by the kidneys with 2.48 ± 0.21 µGy/MBq, the liver with 1.47 ± 0.21 µGy/MBq and the spleen with 1.28 ± 0.3 µGy/MBq. No adverse pharmacological effects were observed.

Conclusions: [99mTc]Tc-99m-N4-BTG appears to be a safe diagnostic agent with a favorable biodistribution. Compared to GRPR- targeted PET tracers, Tc-99m-labelled GRPR ligands could contribute to a broader application due to the widespread availability of SPECT devices. Moreover, this novel 99m-Tc-labelled compound could also have a potential application beyond prostate cancer, namely breast cancer and gastrointestinal stromal tumours.

[1] Haendeler et al., Radiation 2021, 1(1), 33-44.