

The value of Tc-99m-tetrofosmin scintigraphy in the assessment of P-glycoprotein in patients with malignant bone and soft-tissue tumors

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P-glycoprotein (Pgp) overexpression has been shown to be correlated with resistance to chemotherapy in patients with malignant bone and soft-tissue tumors. The aim of our study was to investigate the role of ^{99m}Tc -tetrofosmin as a functional imaging agent reflecting Pgp expression in these tumors. **Methods:** Twenty eight patients with various malignant bone and soft-tissue tumors were studied. Radionuclide angiography with ^{99m}Tc -tetrofosmin was done first and planar images were acquired at 15 min and 90 min postinjection. Vascular phase was evaluated visually on dynamic images, metabolic state was evaluated both visually and quantitatively on planar images. Quantitative analysis was performed by the calculation of tetrofosmin uptake in the lesion against background and percent washout rate (WR%) of the tracer. Immunohistochemical analysis of Pgp was performed on biopsy specimens and the degree of expression was graded from 0 to 3. **Results:** There was a positive correlation between the Pgp score and the washout rate of tetrofosmin ($r = 0.73$, $p = 0.000$). The mean washout rate of tetrofosmin from the lesions with Pgp expression (31.81 ± 6.72) was found to be significantly higher than those of without Pgp expression (21 ± 3.49) ($p = 0.000$). No statistically significant correlation was found between 15 min and 90 min uptake ratios (UR) of tetrofosmin and Pgp score ($r = -0.10$, $p = 0.6$ and $r = -0.21$, $p = 0.2$, respectively). When the cut-off value of 24.5 (according to ROC-analysis) for the washout rate was used to discriminate the lesions with and without Pgp expression, the test yielded a sensitivity value of 87.5% with a specificity of 100%. **Conclusions:** In malignant bone and soft-tissue tumors, ^{99m}Tc -tetrofosmin uptake were not related to Pgp overexpression. Pgp overexpression was found to be correlated with the washout rate of the tracer. ^{99m}Tc -tetrofosmin scintigraphy with washout analysis may not only be a useful method for evaluating Pgp overexpression but also its function.

Key words: Tc-99m-tetrofosmin, P-glycoprotein, malignant bone and soft-tissue tumors