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Internal organs and tumor dosimetry in prostate cancer radionuclide therapy with (PSMA) Lu-177-DOTA-617

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Aim: Dosimetry is a very important procedure to verify reliable implementation of (PSMA) Lu-177-DOTA-617 radionuclide therapy for prostate cancer. The main purpose of this study is to calculate the absorbed dose of targeted critical organs kidneys, bone marrow and parotid gland.

Materials & Methods: 5 patients were subjected to Lu-177-DOTA-617 therapy and 4330.5±1152.3 MBq (117±31.1 mCi) was intravenously administered in a rapid infusion system. After injection, several blood samples were collected in different times (3, 15, 30, 60, 180 minutes and 24, 48, 120 hours) for bone marrow dose calculation. Also whole body scans were performed after 4, 24, 48 and 120 hour to quantify the remainder activity in the total body, kidneys, liver, right parotid, left parotid, right lacrimal and left lacrimal. For organ doses the geaometric mean of anterior and posterior counts were considered after background subtraction and attenuation correction taking in a count the main factors; organ thickness, body thickness and Houns field unites from Computed Tomography scan. All time–activity data were plotted and biexponential fitting, curve was drawn. After integration of Regression curves, cumulative activity of each organ was calculated and MIRD scheme was used for absorbed dose calculations.

Results: Absorbed dose of left kidney, right kidney, liver, left parotid, right parotid, left lacrimal, right lacrimal, bone marrow, tumor and total body was 2.95±0.79, 3.99±3.02, 0.74±0.29, 5.62±4.24, 3.94±1.35, 1.75±1.6, 2.04±1.88, 0.1±0.02, 25.18±17.97 ve 0.12±0.04 Gray(Gy) respectively.

Conclusion: We concluded that Lu-177-DOTA-617 is impressively safe and trustworthy during treatment since there was no organ toxicity or deterioration regisitered. İn other hand, the observable variation in the absorbed dose of the critical organs among the patients reinforce the need to adopt patient- specific dosimetry approach to save body organs.

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