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Relation between Tc-99m sestamibi uptake and biological factors in hyperparathyroidism

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Purpose: The aim of this study was to evaluate the relation between uptake ratios of Tc-99m sestamibi (MIBI) and tumor volume, serum biochemical values (i-PTH, Ca, P) and oxyphil cell content. ***Materials and Methods:*** The study population consisted of 19 patients (2 M, 17 F; mean ± SD: 47 ± 12 y). Anterior planar images of the neck and chest were acquired early (15 min) and triple late phase (1, 2 and 3–4 h) after intravenous injections of 740 MBq MIBI. Each of the surgical materials was reviewed retrospectively. The percentage of cell type (chief, oxyphil and clear cells) in the tumors was calculated by light microscopy. ***Results:*** The uptake ratio obtained from L1 (1 hour) phase was found to be higher than the uptake ratio obtained from early phase, and the difference was statistically significant (1.57 ± 0.34 and 1.43 ± 0.29, $p = 0.004$, respectively). There was no significant correlation between uptake ratios that were obtained from 4 different imaging phases and lesion volumes, i-PTH levels and calcium levels ($p > 0.05$). However, there was a significant adverse correlation between L2 and L3 uptake ratios and serum phosphorus values ($r = –0.44$, $p = 0.04$ and $r = –0.46$, $p = 0.04$, respectively). Additionally, no significant correlation between MIBI uptake ratios of each imaging phase and the laboratory data, volume of lesion or oxyphil percentage volume was found after the multiple regression analysis (E: $p = 0.46$, $r = 0.49$; L1: $p = 0.24$, $r = 0.58$; L2: $p = 0.27$, $r = 0.57$; L3: $p = 0.32$, $r = 0.55$, respectively. There was no correlation between gland oxyphil percentage volume and MIBI uptake ratios ($p > 0.05$). ***Conclusion:*** The results of our study show that the optimal imaging times after intravenous injection of MIBI are 15 minutes and 1 hour because of the shorter examination time without loss of diagnostic ability. In the present study, there was no significant correlation between MIBI uptake ratios and increased gland volume, or serum Ca and i-PTH levels. Besides, we think that oxyphil cell content may not have a main effect on MIBI uptake and retention. The fact of an adverse relation between phosphorus and MIBI retention in our study suggests that phosphorus level should be considered prior to MIBI imaging.

Key words: MIBI, hyperparathyroidism, oxyphil cell, calcium, phosphorus