^{201}Tl SPECT as an indicator for early prediction of therapeutic effects in patients with non-small cell lung cancer

Kazuyoshi Suga, Norihiko Kume, Kazuya Nishigauchi, Nobuhiko Ogasawara, Akiko Hara, Gouji Miura, Tsuneo Matsumoto and Naofumi Matsunaga

Department of Radiology, Yamaguchi University School of Medicine

This study retrospectively investigated the good parameters on thallium-201 chloride (^{201}Tl) SPECT for early assessment of the therapeutic effects in patients with non-small cell lung cancer.

Based on tumor response as determined by chest CT scan about 9 weeks after the end of irradiation with adjuvant chemotherapy, the subjects were divided to the responder group (tumor regression > 50%, n = 13) and non-responder group (tumor regression < 50%, n = 13). ^{201}Tl SPECT was performed before and at the halfway through the course of therapy (average tumor dose, 27.4 Gy ± 4.5) in all the patients. SPECT was conducted twice 15 min (early scan) and 120 min (delayed scan) after intravenous injection of 148 MBq (4 mCi) of ^{201}Tl. Tumor-to-contralateral normal lung tissue count ratios on both scans were calculated as early and delayed uptake ratios (EUR and DUR), and a retention index (RI) was also derived from these ratios.

In the responder group, a significant decrease in DUR and RI halfway through the therapy was observed compared to pretreatment (2.6 ± 0.6 vs. 3.5 ± 1.0 ; p < 0.01, and −2.3% ± 25.5 vs. 37.4% ± 17.8; p < 0.001, respectively), even though EUR did not change significantly (N.S.). By contrast, in the non-responder group, there were no significant changes in any of these parameters (N.S.). When comparing DUR and RI for the two groups halfway through the therapy, DUR and RI were significantly lower in the responder group (both; p < 0.01), but no significant difference was noted in EUR (N.S.), and the percent reduction in tumor size did not correlate with the percent decrease in DUR or RI (N.S.).

These results indicate that the extent of decrease in DUR and RI after therapy can be a useful parameter for early assessment of the therapeutic effects in patients with non-small cell lung cancer.

Key words: thallium-201 chloride, single photon emission computed tomography (SPECT), lung cancer, radiation therapy