Single photon emission computed tomography using $^{201}$Tl chloride in pulmonary nodules: comparison with $^{67}$Ga citrate and $^{99m}$Tc-labeled hexamethyl-propyleneamine-oxime

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A single photon emission computed tomography (SPECT) with $^{201}$Tl chloride (TI-201) was carried out prospectively in 50 patients with pulmonary nodules and its diagnostic value was compared with those of $^{67}$Ga citrate (Ga-67) and $^{99m}$Tc-labeled hexamethyl-propyleneamine-oxime (Tc-99m-HMPAO). TI-201 SPECT provided 88% (early)–91% (delayed) sensitivity, 85% (early and delayed) specificity and 87% (early)–89% (delayed) accuracy. The sensitivity of the TI-201 planar image was 56 (early)–62% (delayed), which was significantly lower than that of SPECT. Delayed SPECT images at 2 hour postinjection were more preferable to disclose the malignant pulmonary nodule than early SPECT images at 15 minutes postinjection. The application of SPECT with Ga-67 failed to improve the sensitivity of planar imaging for malignant pulmonary nodules. Tc-99m-HMPAO was concentrated in 62% of 13 patients with malignant pulmonary nodules, which was slightly higher than Ga-67 in 54% of 28 patients. In an analysis of the histologic types of lung cancer, the sensitivity of TI-201 was not significantly different in all types. On the other hand, Ga-67 was positive only in 25% of 12 patients with adenocarcinoma.

A combination of SPECT and TI-201 is the best choice among routine scintigraphic techniques for depicting malignant pulmonary nodules. The TI-201 SPECT image may play a complementary role in the characterization of pulmonary nodules which are revealed on a plain radiograph and computed tomography.

Key words: single photon emission computed tomography (SPECT), $^{201}$Tl chloride, $^{67}$Ga citrate, $^{99m}$Tc-hexamethyl-propyleneamine-oxime, lung cancer