

Differential diagnosis in patients with ring-like thallium-201 uptake in brain SPECT

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This study was performed to investigate lesions with ring-like thallium-201 (^{201}Tl) uptake and to determine whether SPECT provides any information in differential diagnosis. **Methods:** A total of 244 ^{201}Tl SPECT images were reviewed. In each study, early (15 min postinjection) and late (3 hr) brain SPECT images were obtained with 111 MBq of ^{201}Tl . The early uptake ratio (ER; lesion to normal brain average count ratio) and the late uptake ratio (LR) and the L/E ratio (ratio of LR to ER) were calculated. **Results:** Ring-like uptake was observed in pre-therapeutic 26 SPECT images, including ten glioblastoma multiformes (ER, 3.45 ± 0.64 ; LR, 2.74 ± 0.54 ; L/E ratio 0.80 ± 0.13), five meningiomas (6.48 ± 2.34 ; 4.41 ± 1.41 ; 0.72 ± 0.19), four metastatic lung cancers (3.47 ± 1.23 ; 2.40 ± 0.98 ; 0.70 ± 0.14), four brain abscesses (2.48 ± 1.06 ; 1.59 ± 0.30 ; 0.78 ± 0.15), one invasive lesion of squamous cell carcinoma from the ethmoid sinus (1.54 ; 1.52 ; 0.99), one medulloblastoma (3.53 ; 3.52 ; 1.00) and one hematoma (3.32 ; 2.36 ; 0.71). The ER of meningioma was significantly higher than those of glioblastoma multiforme ($p < 0.0005$), metastatic lung cancer ($p < 0.005$) and brain abscess ($p < 0.0005$). There were no significant differences among these three entities. The LR of meningioma was significantly higher than those of glioblastoma multiforme ($p < 0.005$), metastatic lung cancer ($p < 0.005$) and brain abscess ($p < 0.0001$). The LR of brain abscess was significantly lower than that of glioblastoma multiforme ($p < 0.05$). The L/E ratio could not differentiate these four entities. **Conclusion:** High ER and high LR in a lesion with ring-like uptake is likely an indicator of meningioma. The LR of brain abscess was significantly lower than that of glioblastoma multiforme, but ^{201}Tl SPECT has still difficulty in differentiating abscess from brain tumor.

Key words: thallium-201, SPECT, glioblastoma multiforme, meningioma, brain abscess