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Combined ^{201}Tl and ^{67}Ga brain SPECT in patients with suspected central nervous system lymphoma or germinoma: Clinical and economic value

Shigeru KOSUDA,* Shoichi KUSANO,* Shoichiro ISHIHARA,** Hiroshi NAWASHIRO,** Katsuji SHIMA,** Noriko KAMATA,*** Kenzo SUZUKI*** and Kiyoshi ICHIHARA****

**Department of Radiology, National Defense Medical College*
***Department of Neurosurgery, National Defense Medical College*
****Department of Radiology, Tokyo Metropolitan Komagome Hospital*
*****Department of Health, Yamaguchi University School of Medicine*

Background: Surgical resection is costly and an unfavorable prognostic factor for primary central nervous system (CNS) lymphoma and germinoma patients. ***Objective:*** To assess the diagnostic and economic impact of combined ^{201}Tl and ^{67}Ga brain SPECT on the management of patients suspected of having CNS lymphoma or germinoma. ***Methods:*** Sequential ^{201}Tl and ^{67}Ga brain SPECT was performed in 40 patients with cranial tumors to assess the diagnostic and economic impact of combined ^{201}Tl and ^{67}Ga SPECT on the management of patients suspected of having CNS lymphoma or germinoma. All intracranial masses were pathologically confirmed. The final diagnoses of a total of 47 foci were: 11 non-Hodgkin's lymphomas in 10 patients, 3 germinomas in 2 patients, 10 glioblastomas in 9 patients, 10 cerebral metastases in 8 patients, 13 meningiomas in 11 patients. Decision-tree sensitivity analysis for pretest probability regarding expected cost saving was performed for introduction of the combined study. ***Results:*** All but one focus of CNS lymphomas or germinomas (92.9%, 13/14) exhibited more intense uptake of ^{67}Ga than of ^{201}Tl ($p < 0.001$). All foci of glioblastomas (10/10) and meningiomas (13/13), and 60% of metastatic foci (6/10) exhibited higher uptake of ^{201}Tl than of ^{67}Ga ($p < 0.035$). Expected cost saving in the 1% to 50% range of pretest probability of CNS lymphoma or germinoma would be from minus $842US to plus $2,047US per patient for introduction of the combined study, because of substitution of stereotactic biopsy for craniotomy. The pretest probability was the key factor for cost saving of the combined study. ***Conclusions:*** A ^{67}Ga-positive and ^{201}Tl-positive pattern with more intense uptake of ^{67}Ga than ^{201}Tl probably suggests CNS lymphoma or germinoma. This combination study appears to be cost-effective only in patients highly suspected of having CNS lymphoma or germinoma.

Key words: brain neoplasms, cost-benefit, brain SPECT, ^{67}Ga citrate, ^{201}Tl chloride