11C choline positron emission tomography

Five articles comprising 6 studies with total 118 patients (134 scans) were enrolled for a metaanalysis. There was no heterogeneity or publication bias among the included studies. The pooled sensitivity and specificity were 0.87 (95% confidence interval [CI]: 0.78, 0.93) and 0.820 (95% CI: 0.69, 0.91), respectively. The pooled diagnostic odds ratio was 35.50 (95% CI: 11.70, 107.75). The area under the curve was 0.9170 (95% CI: 0.8504, 0.9836), with Q* index equaling to 0.8499. The diagnostic accuracy of each subgroup showed no statistical differences with that of the overall group.

This meta-analysis indicated 11C-choline has high diagnostic accuracy for the identification of tumor relapse from radiation induced necrosis in gliomas [1].

The results of 11C-choline positron emission tomography (PET) in 22 patients suspected of having brain tumours were compared with the findings of contrast-enhanced magnetic resonance (MR) imaging and fluorine 18 fluorodeoxyglucose PET. A histopathological diagnosis was made for each patient during open surgery. The standardised uptake values of brain tumours and the tumour-to-white matter count (T/W) ratios were determined. The degree of 11C-choline accumulation noted in PET images was compared with the gadolinium-enhanced areas of MR images. The mean T/W ratio of 11C-choline in high-grade gliomas was found to be higher than that in low-grade gliomas. This difference was statistically significant (mean+/-SD: 8.7+/-6.2, n=9 versus 1.5+/-0.7, n=5, P<0.03) when data pertaining to the prominent uptake of 11C-choline in a patient with a pilocytic astrocytoma were excluded. 11C-choline PET failed to detect non-neoplastic lesions in two patients. Areas of 11C-choline accumulation in PET scans were larger than areas enhanced on MR images in five cases involving high-grade gliomas. 11C-choline PET differentiated between low-grade gliomas and high-grade gliomas, but did not differentiate between low-grade gliomas and non-neoplastic lesions. The combination of 11C-choline PET and MR imaging may provide investigators with an accurate means by which to identify high-grade gliomas [2].

Epileptogenic foci

A new role of 11 C-Choline PET in localizing the epileptogenic foci in insular cortex in the patients [3].

1)
Gao L, Xu W, Li T, Zheng J, Chen G. Accuracy of 11C-choline positron emission tomography in differentiating glioma recurrence from radiation necrosis: A systematic review and meta-analysis. Medicine (Baltimore). 2018 Jul;97(29):e11556. doi: 10.1097/MD.0000000000011556. PubMed PMID: 30024551.
2)
Ohtani T, Kurihara H, Ishiuchi S, Saito N, Oriuchi N, Inoue T, Sasaki T. Brain tumour imaging with carbon-11 choline: comparison with FDG PET and gadolinium-enhanced MR imaging. Eur J Nucl Med. 2001 Nov;28(11):1664-70. PubMed PMID: 11702108.
3)
Chen YF, Wei R, Yuan GQ, Gao DD, Jin Q, Cui XY, Zhang GX, Guo J. A new role of (11) C-Choline PET in localizing the epileptogenic foci in insular cortex in the patients. CNS Neurosci Ther. 2019 Sep 11. doi: 10.1111/cns.13215. [Epub ahead of print] PubMed PMID: 31508896.