Cryptococcus Diagnosis

Cryptococcal infections of the nervous system can cause severe neurological disability when diagnosis is delayed. Sensitive and specific tests are readily available and should be considered when an unusual clinical presentation is encountered [1].

The diffusion-weighted image shows Hypointensity in the central cavity of the cryptococcoma, while apparent diffusion coefficient maps show hyperintensity. The imaging features of an intracerebral cryptococcoma mimic that of a central necrotic brain tumor, rather than a pyogenic brain abscess [2].

Proton magnetic resonance spectroscopy (MRS) complements conventional methods used to differentiate intracranial cystic lesions. We report MRS findings of three cases that were diagnosed as pyogenic, tuberculous, and Cryptococcus abscesses before instituting any medical or surgical therapy. The pyogenic brain abscess had typical specific spectral findings (i.e., the demonstration of amino acids). Lactate and lipid peaks were visible in the tuberculous abscess. Cryptococcus neoformans can appear differently in different brain regions, which may lead to different spectral findings [3].

The aim of a study was to detect and localize fungal brain lesions caused by Cryptococcus species based on Chemical Exchange Saturation Transfer (CEST) MR imaging of endogenous trehalose, and hereby to distinguish cryptococcomas from gliomas. In phantoms, trehalose and cryptococcal cells generated a concentration-dependent CEST contrast in the 0.2 - 2 ppm chemical shift range, similar to glucose, but approximately twice as strong. In vivo single voxel MRS of a murine cryptococcoma model confirmed the presence of trehalose in cryptococcomas, but mainly for lesions that were large enough compared to the size of the MRS voxel. With CEST MRI, combining the more specific CEST signal at 0.7 ppm with the higher signal-to-noise ratio signal at 4 ppm in the CryptoCEST contrast enabled localization and distinction of cryptococcomas from the normal brain and from gliomas, even for lesions smaller than 1 mm3. Thanks to the high endogenous concentration of the fungal biomarker trehalose in cryptococcal cells, the CryptoCEST contrast allowed identification of cryptococcomas with high spatial resolution and differentiation from gliomas in mice. Furthermore, the CryptoCEST contrast was tested to follow up antifungal treatment of cryptococcomas. Translation of this non-invasive method to the clinic holds potential for improving the differential diagnosis and follow-up of cryptococcal infections in the brain [4].

1)
Eric Searls D, Sico JJ, Bulent Omay S, Bannykh S, Kuohung V, Baehring J. Unusual presentations of nervous system infection by Cryptococcus neoformans. Clin Neurol Neurosurg. 2009 Sep;111(7):638-42. doi: 10.1016/j.clineuro.2009.05.007. Epub 2009 Jun 21. PubMed PMID: 19541406.
2)
Ho TL, Lee HJ, Lee KW, Chen WL. Diffusion-weighted and conventional magnetic resonance imaging in cerebral cryptococcoma. Acta Radiol. 2005 Jul;46(4):411-4. PubMed PMID: 16134319.
3)
Dusak A, Hakyemez B, Kocaeli H, Bekar A. Magnetic resonance spectroscopy findings of pyogenic, tuberculous, and Cryptococcus intracranial abscesses. Neurochem Res. 2012 Feb;37(2):233-7. doi: 10.1007/s11064-011-0622-z. Epub 2011 Oct 16. Review. PubMed PMID: 22002661.
4)
Vanherp L, Govaerts K, Riva M, Poelmans J, Coosemans A, Lagrou K, Gsell W, Vande Velde G, Himmelreich U. CryptoCEST: A promising tool for spatially resolved identification of fungal brain

lesions and their differentiation from brain tumors with MRI. Neuroimage Clin. 2021 Jun 24;31:102737. doi: 10.1016/j.nicl.2021.102737. Epub ahead of print. PMID: 34225021.