

Brain Temperature, Choline, N-Acetyl-Aspartate, and Myo-Inositol Measured by MRS Can Only Be Considered Diagnostic Biomarkers if Their Criteria are Met [Letter]

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Dear editor

We read with interest the article by Mueller et al on a prospective, cross-sectional observational study using magnetic resonance spectroscopy (MRS) that monitored brain temperature and metabolites such as myo-inositol, choline, and N-acetylaspartate in patients with functional seizures (FSs), psychiatric controls (PCs), and healthy controls (HCs).¹ Brain temperature was higher in FSs than HCs in the orbitofrontal cortex (OFC) and anterior cingulate gyrus (ACG) and lower in the occipital cortex and frontal lobe. PCs showed lower temperatures than HCs in the frontal lobe and cerebellum. Myo-inositol was higher in FSs than HCs in the precentral gyrus, posterior temporal gyrus, ACG and OFC, and choline was higher in the occipital lobe. Choline was higher in the ACG and OFC in PCs than HCs, and N-acetylaspartate was higher in the ACG. In FSs, brain temperature correlated with depression, quality of life, psychological symptoms, and disability, choline with disability, and myo-inositol with hostility, disability, and quality of life. The study is impressive, but some points require further discussion.

The first point is that abnormalities in MRS are generally nonspecific. An increased myo-inositol peak, as found in FSs, has also been seen in low-grade astrocytoma, progressive multifocal leukoencephalopathy (PML), Alzheimer's disease, Down syndrome, regions of gliosis, cytomegalovirus infection, subacute sclerosing panencephalitis, ependymoma, or pantothenate kinase-associated neurodegeneration.² The myo-inositol peak can be reduced in glioblastoma, and hepatic encephalopathy.² An elevated choline peak, as seen in FSs, has also been described in patients with neoplasms (e.g. glioblastoma, diffuse glioma, metastasis), demyelination, inflammation, and gliosis).³ An elevated N-acetylaspartate peak has also been reported in Canavan disease, cerebral ischemia, glioblastoma, and multiple sclerosis.⁴ Low N-acetylaspartate peaks have been reported in schizophrenia, high-grade gliomas, radionecrosis, carcinosis, and cerebral lymphoma.⁴ Therefore, we should know whether all these differential diagnoses were completely excluded in the included patients and controls.

The second point is that psychiatric patients are not the ideal control group. These patients often experience functional seizures.⁵ Therefore, we should know how many of the psychiatric patients serving as controls had functional seizures.

The third point is that body temperature and therefore brain temperature, depend not only on whether a patient has functional seizures, but also on infection status, comorbidities, and current medications.

The fourth point is that functional seizures should be analysed not only by MRS, but also by electroencephalography (EEG), video EEG, neuropsychological and psychiatric assessment and cerebral imaging.

In summary, the interesting study has limitations that put the results and their interpretation into perspective. Removing these limitations could strengthen and support the study's message. Before using MRS metabolites as biomarkers for functional seizures, several differential causes of increased or decreased MRS peaks must be thoroughly excluded.

Disclosure

The author reports no conflicts of interest in this communication.

References

1. Mueller C, Sharma AA, Szaflarski JP. Peripheral and central nervous system biomarkers of inflammation in functional seizures: assessment with magnetic resonance spectroscopy. *Neuropsychiatr Dis Treat*. 2023;19:2729–2743. doi:10.2147/NDT.S437063
2. Gaillard F, Alhusseiny K, Yap J, et al. Myo-inositol peak. Reference article, Radiopaedia.org. Available from: <https://doi.org/10.53347/rID-13185>. Accessed April 04, 2024.
3. Gaillard F, Worsley C, Soliman A, et al. Choline peak. Reference article, Radiopaedia.org. Available from: <https://doi.org/10.53347/rID-27823>. Accessed April 04, 2024.
4. Gaillard F, Murphy A, Sciacca F, et al. N-acetylaspartate (NAA) peak. Reference article, Radiopaedia.org. Available from: <https://doi.org/10.53347/rID-27827>. Accessed April 04, 2024.
5. Say GN, Taşdemir HA, Ince H. Semiological and psychiatric characteristics of children with psychogenic nonepileptic seizures: gender-related differences. *Seizure*. 2015;31:144–148. doi:10.1016/j.seizure.2015.07.017

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