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Metabolite fingerprint detected with HR-MAS spectroscopy in ex vivo samples of cases with congenital hydrocephalus

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Background

Changes in the profile of metabolites in brain and/or fluids can be useful to evaluate the severity and evolution of hydrocephalus, and consequently to help in treatment decisions. Magnetic Resonance Spectroscopy can be used in ex vivo samples for such purposes. This study was designed to evaluate the levels of metabolites in the hyh mouse brain with congenital hydrocephalus by High Resolution Magic Angle Spinning (HR-MAS) Magnetic Resonance Spectroscopy (MRS).

Materials and Methods

Wild type and hydrocephalic hyh mice at 30 days of postnatal age were sacrificed (n = 10-15 mice/disease condition), and hippocampus and neocortex were quickly dissected out, frozen in dry ice, and stored at -80ºC, before analysis by HR-MAS.

Results

Similar levels of choline (Cho) were detected in the hippocampus and neorcortex of hydrocephalic mice compared to control samples, however phosphocholine (PCh) and glycerophosphorylcholine (GPC) displayed lower levels. These molecules are implied in the Kennedy pathway of phosphatidylcholine metabolism. The antioxidant tripeptide glutathione (GSH) was detected in higher quantities in the hydrocephalic mice, probably revealing a response to an oxidative metabolism. Other metabolites displayed remarkably higher levels in samples from hydrocephalic mice, such as creatine (Cr), taurine (Tau) and glutamine (Gln).

Conclusions

HR-MAS was found as a reliable technique to detect differential levels of metabolites in small tissue biopsies samples from mice models with hydrocephalus. This technique represents a valuable tool for monitoring the degree of severity and/or the evolution of the disease in such models.

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No conflict of interest to declare.

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