EARLY MAGNETIC RESONANCE SPECTROSCOPY RENORMALIZED OF PREFRONTAL CORTEX AND ANTERIOR CINGULATED CORTEX METABOLITES IN HEPATIC ENCEPHALOPATHY AFTER LIVER TRANSPLANTATION

H. lou[1], D. Shang[2], and M. Zhang[3]

[1]Department of Radiology, the First Affiliated Hospital,School of Medicine, Zhejiang University, hangzhou, zhejiang, China, People's Republic of, [2]departmetn of radiology, The First affiliated Hospital, hangzhou, zhejiang, China, People's Republic of, [3]department of radiology, The First affiliated Hospital,Medical School of Zhejiang University, hangzhou, zhejiang, China, People's Republic of

Background or purpose: Neurologic complications are common in patients with decompensated chronic liver disease before solid organ transplantation. Specific pattern at localized proton MR spectroscopy of the brain exists when short echo times are used in patients with hepatic encephalopathy. The results of spectroscopy reveal decreased amplitudes of myo-inositol (mI) and choline(Cho) combined with increased levels of glutamine and glutamate(Glx). Preliminary data indicate that liver transplantation may completely reverse the spectral abnormalities in hepatic encephalopathy. We focus our investigation in the prefrontal cortex (PFC) and anterior cingulated cortex (ACC) in spectroscopic findings after liver transplantation. And we also evaluated the characteristic changes of brain metabolites at early stage.

Methods: In this study, 12 patients(9 male,3 female, mean age:46±5.2 years) with hepatic cirrhosis proven by pathology underwent complete MR imaging and 1H spectroscopic examination before liver transplantation and at 2-3 week follow-up after liver transplantation. Spectrum was performed by using 3.0-T whole body tomography (Achieva, Philips, Holland) and a commercially available circularly polarized head coil. For the follow-up examinations, exact reproducibility of the spectral localization was achieved by acquiring three orthogonal (sagittal, transverse and coronal) gapless, we used short TE (TE=9ms) STEAM protocol and placed the volume of interest in the PFC and ACC. This area contains gray and white matter and allows measurement of $2\times4\times3.5\text{-cm}^3$ and $6\times3\times2\text{-cm}^3$ volume of interest respectively.

Results: 2-3weeks after liver transplantation, ^{1}H spectroscopic changes-elevated Cho/Cr ratio ($t=-3.113$, $p=0.006<0.05$) and decreased Glx2.11/Cr ratio ($t=2.439$, $p=0.025<0.05$)were found in all patients in ACC region. Simultaneously, MR spectroscopic measurements reveal a characteristic decreased in Glx2.11/Cr ratio ($t=3.397$, $p=0.004<0.05$) in PFC region. Other metabolite ratios (mI, NAA and Glx3.75) reveal no statistical difference after liver transplantation.

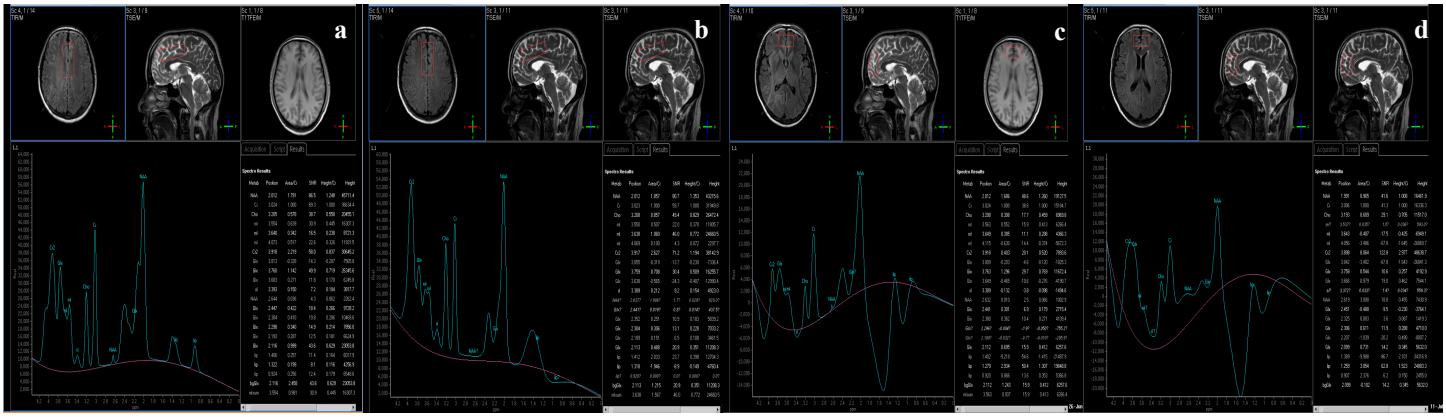

Fig 1 graph illustrates the comparison of metabolite ratios before and after liver transplantation. The patients have a significantly elevated Cho/Cr and decreased Glx2.11/Cr ratio (a,b) in the ACC region. Also, they have a characteristic decreased Glx2.11/Cr ratio(c,d) in PFC region. (b,d-after liver transplantation)

Conclusion: After successful liver transplantation, renormalization of hepatic encephalopathy specific brain metabolite changes is detected at 1H spectroscopy and precedes the imaging abnormalities. Cho and Glx2.1 may be an early and sensitive index strongly indicates the recovery of amino acid metabolism.

Reference

Naegele T, Grodd W, Viebahn R, et al. MR imaging and 1H spectroscopy of brain metabolites in hepatic encephalopathy:time-course of renormalization after liver transplantation. Radiology, 2000;216 (9):683-691