Body Of Abstract

Background: Patients with cirrhosis and prior overt hepatic encephalopathy (OHE) could have persistent learning impairments. The Stroop App (EncephalApp), which has an easier “Off” and difficult “On” parts, has been used to define CHE in cirrhosis with the “Off” state being a sensitive measure of the subcortical impairment when compared to other gold standards. The "Off" State relies on psychomotor speed while cognitive flexibility, an indicator of pre-frontal cortex integrity, is also required for the "On" state. The relative impact of the App’s learning component, to define cognitive impairment in OHE has not been studied. Aim: To define the learning capability of OHE patients compared to no-OHE cirrhotics and controls on the On and Off state of the EncephalApp. Methods: Cirrhotic outpatients with/without prior OHE controlled on therapy and healthy controls underwent EncephalApp testing. All subjects had mini-mental status >25, were able to provide informed consent and were able to complete the tests. Each administration of the EncephalApp requires 5 “off” and 5 “on” runs; we studied the difference in time required between run 1 and run 5 (delta 1-5) in the both states in controls, all cirrhotics and then compared them between prior OHE and no-HE patients. Results: 42 controls and 388 cirrhotics (150 prior OHE, MELD 11) with similar age (64 vs 61, p=0.9) were included. The 150 prior OHE cirrhotics had a similar age, education compared to no HE (60 vs 61 yrs, p=0.47, 13 vs 13 yrs education, p=0.61) but a higher MELD score (13 vs 10, p=0.005). Overall OffTime and OnTime was significantly higher in cirrhotics compared to controls (All values in seconds; Off 82.6 vs 72, p <0.0001, On 99 vs 82, p<0.0001) and in OHE cirrhotics compared to no-HE (Off 99 vs 78.64, p <0.0001, On 115.74 vs 92.93, p<0.0001) No significant learning was seen in the “Off” State in any group (table). Healthy controls were able to
learn the “On” State better than cirrhotic patients as a whole and in comparison with OHE and no-OHE cirrhotics individually. Similarly prior OHE patients demonstrated lower ability to improve on the On state compared to no-OHE patients. Conclusion: Cognitive flexibility as tested by the On state of the EncephalApp improves over time in healthy controls and cirrhotics without OHE but not in prior OHE patients. Psychomotor speed remains similar over time. These data suggest that prior HE severity differentially impacts brain regions. While subcortical impairment results in psychomotor slowing earlier on and does not have appreciable learning, it is likely that OHE further impacts prefrontal cortex integrity, resulting in an inability to improve and learn from prior experience.

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