Cognitive Processing Speed (PS) Improvement in Alcohol Related Brain Damage (ARBD)

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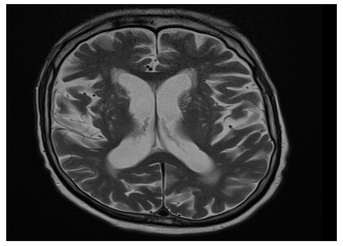
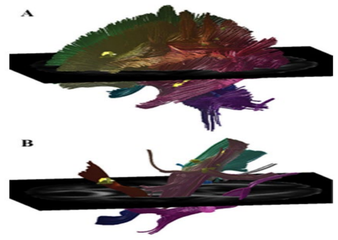
Introduction

- Alcohol related brain damage (ARBD) is characterised by cognitive impairment, and has a causative link to excessive alcohol ingestion and thiamine deficiency.
- It is complex; with deficits in anterograde memory, executive function, attention, processing speed (PS), visuospatial skills and IQ. Approximately 25% have ischaemic or traumatic head injury events.[1]
- Oslin's Alcohol Dementia Criteria [2] recommends cognitive assessment **after three months** of alcohol abstinence for evaluation of the long standing cognitive deficits. Cognitive improvement was not observed in patients with concomitant vascular lesions.
- Cognitive domains in ARBD studies include verbal fluency (VF), memory, abstraction and perceptual motor skills.
- There are no current treatment guidelines for ARBD cognitive deficits.
- Various cognitive domains showed some improvement with Donepezil, Rivastigmine and Memantine; **but no improvement in PS have been identified in previous studies.**
- Our patient, showed improvement in PS with Memantine.



T2 weighted axial view of the MRI Head.



Turken A, et.al. Cognitive processing speed and the structure of white matter pathways: convergent evidence from normal variation and lesion studies.

Results

Index / IQ Subtest	21.08.21 (Before Meman-tine)	01.11.21 (After Meman-tine)	Descriptive Category	Confidence Interval
Verbal Compreh-ension	110	110 (No improvement)	Average	104-115
Perceptual Reasoning	86	**88 (Improvement)**	Low Average	80-93 / 82-95
Working Memory	92	92 (No improvement)	Average	86-99
Processing Speed	62	**71 (Improvement)**	**Extremely Low to Borderline**	57-74 / 66-82
General Ability Index	99	**100 (Improvement)**	Average	83-91 / 95-105

- The WAIS-IV UK 3 month follow up showed statistical improvement in Perceptual reasoning, Processing speed and General Ability index

Discussion

- Previous ARBD studies indicate **abstinence related cognitive improvements** in delayed recall, VF and general intellectual functioning**, but, not in memory and inhibition**[4].
- Memantine (non-competitive NMDA antagonist) is associated with cognitive improvement in VF, confrontational naming, word list memory, constructional praxis recall and trail making A. No studies have measured processing speed.
- Processing speed is associated with the superior longitudinal fasciculus and white matter tracts within parietal and temporal cortices and left middle frontal gyrus[5].
- Functional neuroimaging in ARBD has shown white matter loss in the prefrontal cortex, superior prefrontal association cortex, cerebellum, hypothalamus and corpus callosum[6].
- Alcohol possibly upregulates NMDA receptors and glutamate excitotoxicity with impaired oligodendrocyte function and white matter lesions[7].
- Memantine, possibly prevents glutamate toxicity and may improve oligodendrocyte function myelination restoration.
- Therefore, processing speed improvements may be related to lesion repair secondary to Memantine effect on oligodendrocyte function.

Conclusion

- Recommend further cognitive studies in memantine use in ARBD including cognitive PS.

Case Summary

- We present a case of a 68-year-old man with a 30 year history of alcohol dependence of 9 units per day (substantially increased in the 7 years pre-admission),
- Resulting in self-neglect, impulsivity, aggression, hallucinations, and chronic neuropsychiatric sequelae and cognitive impairments.
- He met the criteria for ARBD[1] with prolonged cognitive impairment, causative association with alcohol use requiring thiamine replacement[3].
- CT-Abdomen showed hepatic atrophy and MRI-Head demonstrated moderate small vessel disease.
- Three months abstinence - Self-neglect, impulsivity, aggression, and hallucinations improved, however, neuropsychiatric impairments persisted.
- Ten months abstinence- self report mood disorder screening and typical dementia blood screen were unremarkable.
- A Wechsler Adult Intelligence Scale-IV UK (includes a test of PS), was performed and Memantine commenced (uptitrated to British National Formulary maximum.)

References

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