

# Association between etiology and patterns of Neuro-cognitive impairment detected with Wechsler Memory Scale (WMS-IV) Assessment: Prospective study in 71 consecutive patients

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## INTRODUCTION

The psychometric test Wechsler Memory Scale (WMS-IV) is a standardized cognitive test battery designed to measure different cognitive memory functions in adults. WMS IV was revised and standardized as a neuro-psychometric test in 1600 patients. We studied patterns of memory loss to identify the differences as detected by Wechsler Memory Scale in patients with impaired cognitive functions from different etiologies of acquired brain injury (ABI).

We, as a specialized out-patients center for mild and stable ABI/TBI patients and cognitive research center, had an opportunity to study 71 patients and compare their results. According to recently published data by the CDC, approximately 40% of mTBI patients have at least one unmet need / with problem even after one year of injury. The top three unmet needs were:

improving memory and problem solving, managing stress and emotional upsets, and improving vocational skills at pre injury level.

*All the above needs are related to the neuro-cognitive impairment.*

## MATERIAL AND METHODS

71 patients (43 F: 28 M) with neuro-cognitive impairment due to traumatic brain injury (n= 40), uncomplicated dementia (n = 20), cerebral hypoxia (n = 4), and other causes (n = 7) were administered WMS-IV. The mean patient age was 49 years (range 19-82 years). Test results indicate patient's performance as Index Scores: Auditory Memory (AMI), Visual Memory (VMI), Immediate Memory (IMI), and Delayed Memory (DMI). Scores are also expressed as percentiles. A score of 100 is considered average (50 percentile). Analysis was performed to detect association with respective etiology.

The same patient population was also tested by a 2<sup>nd</sup> standard psychometric test Neuro-Cognitive Assessment battery( NAB), a screening module in auditory memory, visual memory and delayed memory recall, and executive functioning.

## METHOD Cont..

Exclusion criteria: patients who had presented to us for the first time after >36 months post acquired brain injury, any pre-morbid conditions in insomnia, depression, previous TBI, and patients on narcotics, sedative, or cognition altering drugs were excluded. The average period of the WMS IV test from the 71 patients was 20 months.

Symptoms Present	Number
Age	19-82 Years
F: M	43:28
TBI	40
Dementia	20
Cerebral Hypoxia	4
CVA	7

As part of standard protocol, we administered MoCA to all patients at the intake visit. This test makes assessment of 7 cognitive functions, namely visuo-spatial, naming, memory, attention, language, abstraction, and orientation and allocates individual scores.

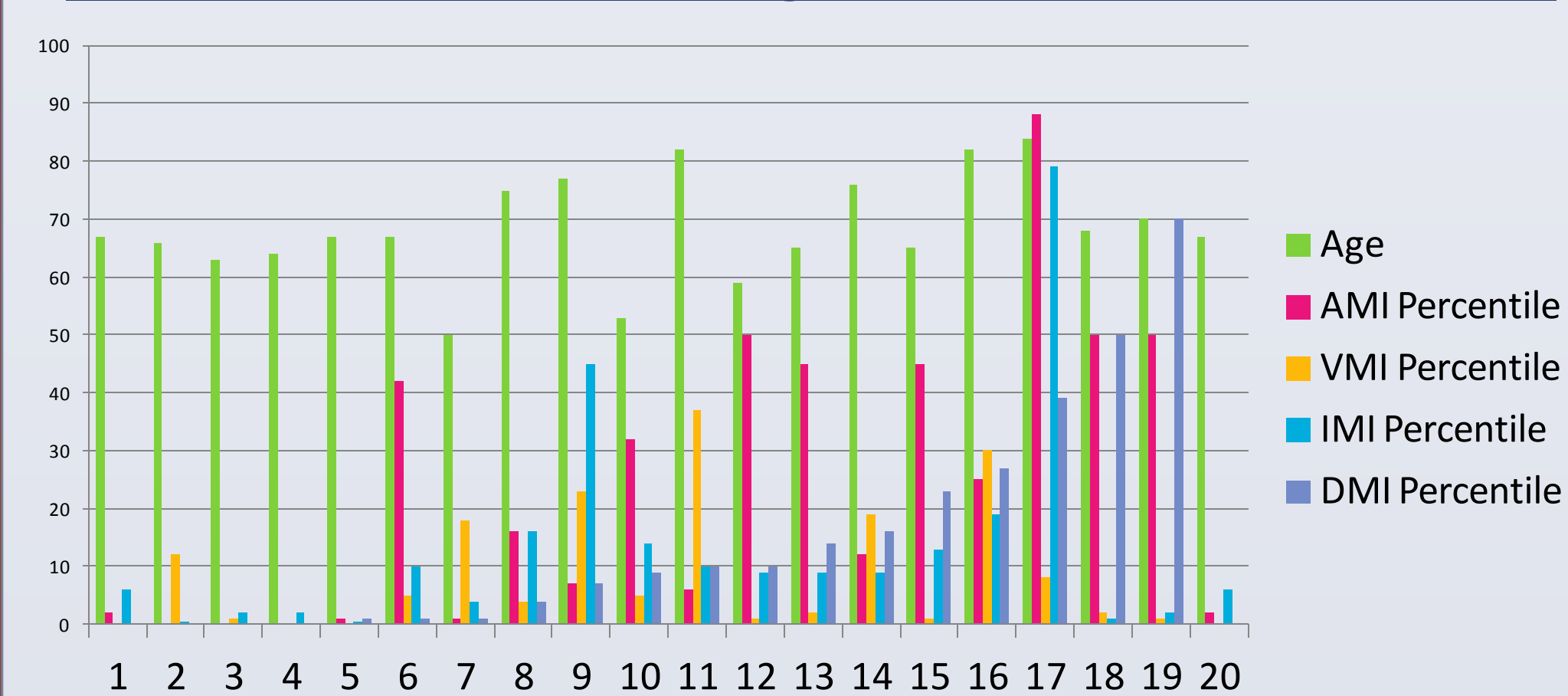
From our previous studies, we have learned that cognitive impairment in visuo-spatial, memory, attention, and language triggered the test for the WMS IV. Two patients were rescheduled for the test due to over night sleep deprivation.

The same patient population was also tested by a 2<sup>nd</sup> standard psychometric test Neuro-Cognitive Assessment battery (NAB), a screening module also showed similar results in mild, moderate, and severe impairment in auditory memory, immediate memory, visual memory, delayed memory recall, and executive functioning.

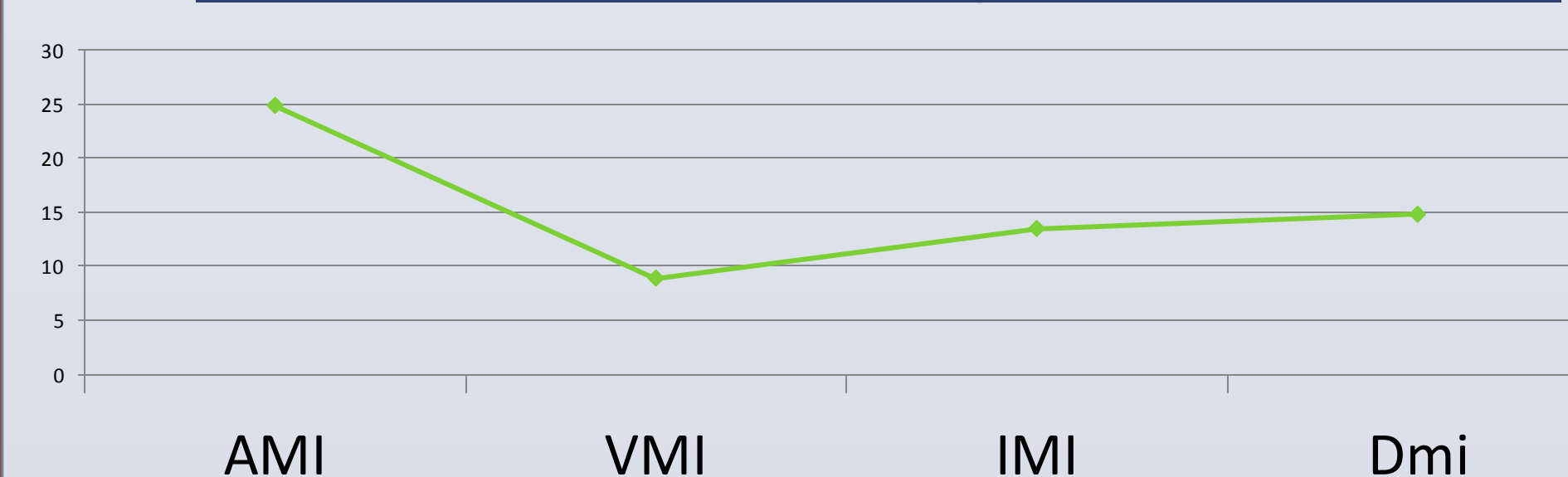
## RESULTS:

For TBI patients, average AMI, VMI, IMI and DMI scores were 85, 76, 81 and 75 (16, 5, 10 and 4 percentile). In Dementia patients, the scores were 79, 67, 74 and 71 (7, 1, 4 and 2 percentile). In hypoxia the scores were 97, 59, 77 and 48 for AMI, VMI, IMI and DMI (42, 0.3, 6 and 0.1 percentile). In both TBI and hypoxia, visual and delayed memories were the worst affected while the auditory memory was preserved. Dementia affected all modalities equally. Delayed recall was the most impaired in every etiology.

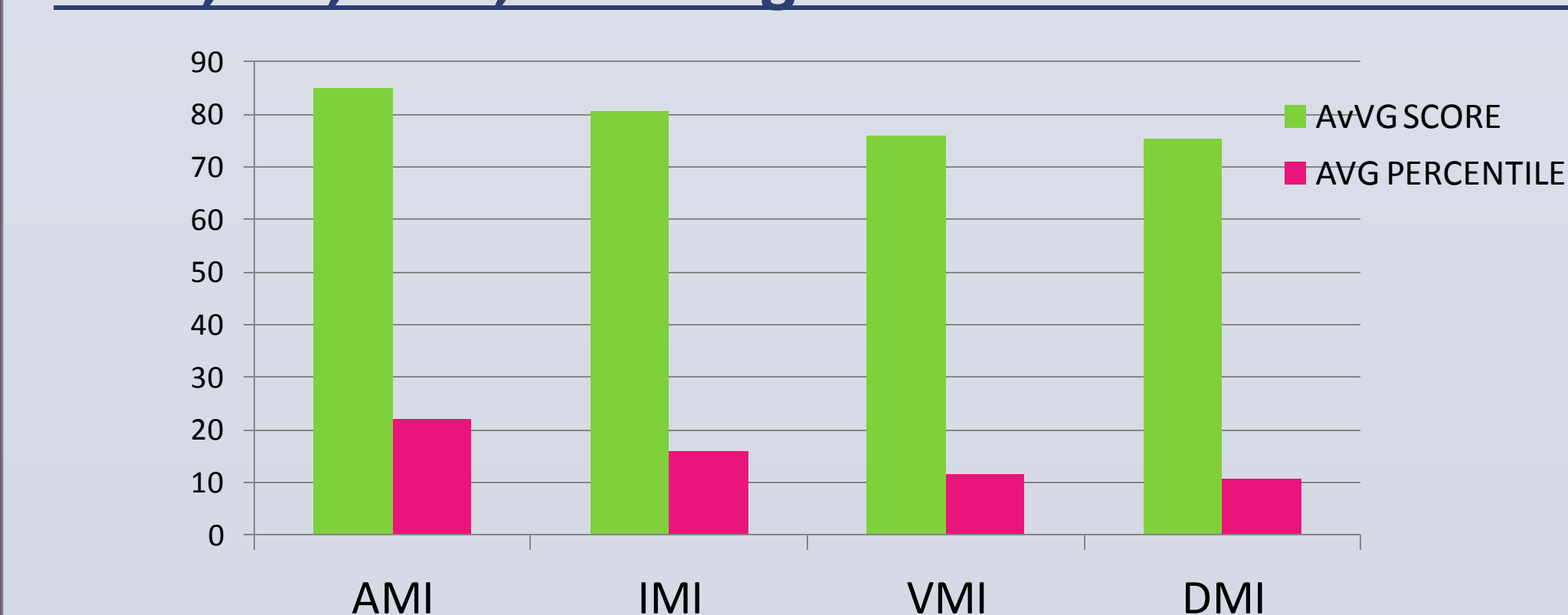
### AMI,IMI, VMI, DMI Avg Percentile in Dementia



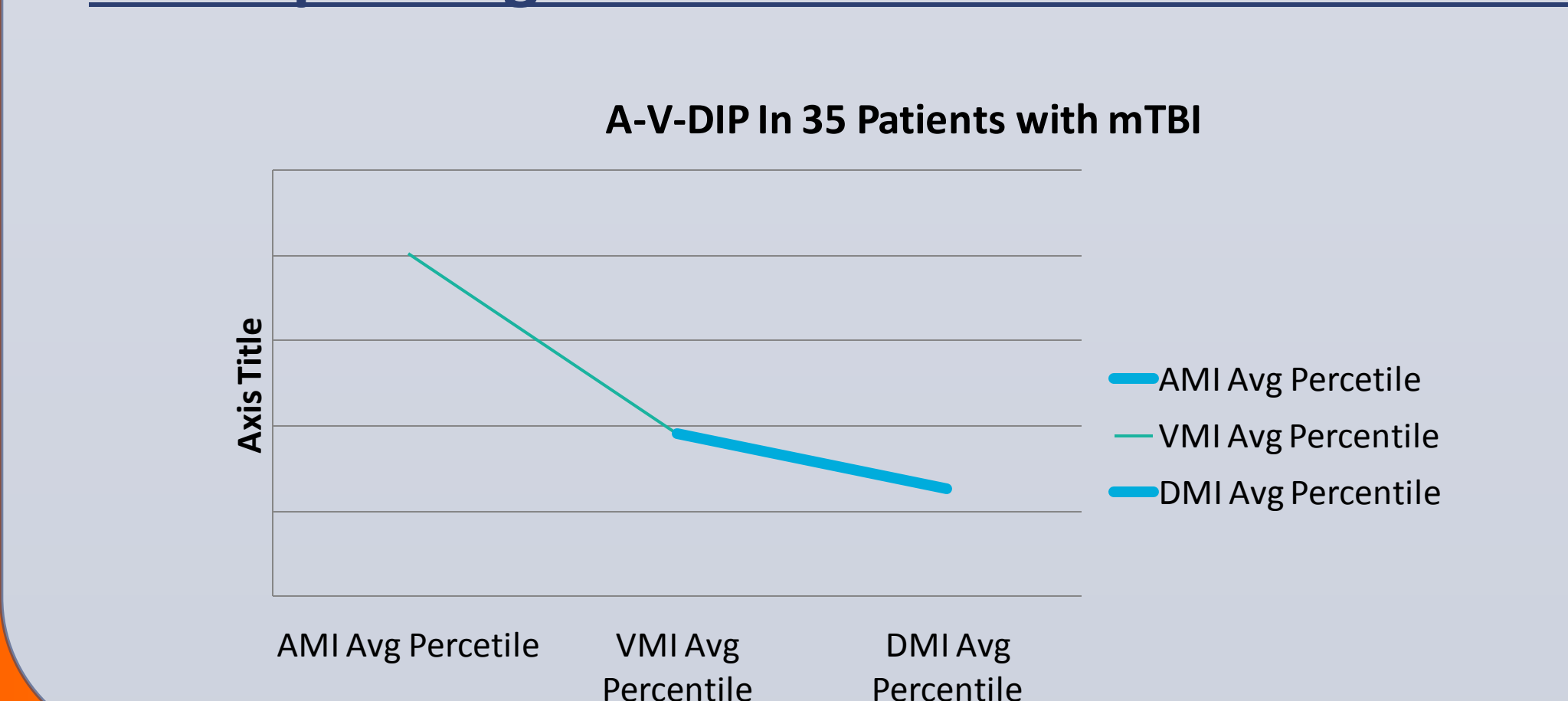
### AMI,IMI, VMI, DMI Avg Percentile Score



### AMI,IMI, VMI, DMI Avg Percentile Score in mTBI



### A-V-Dip in Avg Percentile score in mTBI Patients



## CONCLUSIONS

Auditory memory is relatively preserved in TBI and hypoxic brain injury. A disproportionate impairment of visual memory is strongly suggestive of injury or hypoxic insult; dementia impairs all modalities of memory equally. Detection of these patterns can help indicate the etiology of cognitive impairment in patients with ambiguous diagnoses.

Assessment of cognitive impairment should be a mandatory protocol while evaluating patients of mTBI. A majority of mTBI patients continue to suffer from occult cognitive impairment long after the initial injury. Impairment of visual memory and delayed recall (V-D-IP) is the significant pattern seen in all patients with mTBI with consistent results in all 35 patients in the study group. mTBI with persistent symptoms after 4 weeks should have assessment of cognitive functioning as a standard protocol with specific emphasis on A-V-DIP.

### Author Recommendations:

- Mandatory 2 week and 3 month follow up after ABI with trained physician in Cognition and TBI .
- Routine screening of ABI patients with MoCA .
- Positive MoCA with persistent symptoms of cognitive impairment should be further tested with standardized WMS-IV and confirmed with A-V-DIP sign.
- ABI/mTBI patients should be given an opportunity to Neuro-Cognitive Rehab as active intervention rather than letting nature takes its own course or labeled as percentage disability in our veterans. Please follow our poster # P6.189.

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