

A Pilot Study to Assess Cognitive burden of Ovarian Cancer and Chemotherapy

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Introduction

- Chemo-brain** refers to cognitive impairment related to cancer and its treated and is contributed by the cancer itself, chemotherapy, hormonal imbalances(oophorectomy) and psychological factors. [1]
- Upto **70% of ovarian cancer patients** report cognitive-changes following treatment for their cancer. [2]

Objective

To assess cognitive function via objective methods in Indian women with ovarian cancer at diagnosis, after first three months and six months after chemotherapy.

Study Design

- Pilot study-** included 34 women newly diagnosed with ovarian cancer tested at time of diagnosis, after 3 cycles and after 6 cycles of chemotherapy.
- Inclusion criteria:** Women with a diagnosis of ovarian cancer between ages 25-65 years who are able to perform the test with normal or corrected vision.
- Tools used:** MOCA questionnaire, Motor-related cortical potentials using Nihan-Kohden MEB-2300, fNIRS using COBI software

Results- Mean MOCA scores

MOCA Score	At time of diagnosis N=34	1 st follow up N=24	2 nd follow -up N=22	P value
Mean Score±SD	29.5±1.4	28.1±1.7	28.0±1.8	0.001
Severity of Cognitive Impairment				
Normal cognitive function >25	31(91.1%)	22(91.66%)	20(90.9%)	0.9
Mild cognitive impairment 17-25	3(8.9%)	2(8.33%)	2(9.1%)	
Moderate cognitive impairment 10-17	0	0	0	

Mean MOCA score decreased from 29.5±1.4 at diagnosis to 28.1±1.7 at the first follow-up and 28.0±1.8 at the second follow-up (p=0.001). Orientation domain was worst-affected: (p value=0.04)

Materials and Methods

MOCA Scale

- Subjective measure of cognitive function

Fig 1: MOCA Questionnaire

MONTREAL COGNITIVE ASSESSMENT (MOCA)

Education : Date of birth : Sex : DATE :

VISUOSPATIAL / EXECUTIVE

Copy cube Draw CLOCK (Ten past eleven) (3 points)

5 1 2 3 4 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12

NAMING

Read list of words, subject must repeat them. Do 2 trials. Do a recall after 3 minutes.

FACE VELVET CHURCH DAISY RED

1st trial 2nd trial No points

ATTENTION

Read list of digits (5 digit/ sec.). Subject has to repeat them in the forward order 2 1 8 5 4 /2

Subject has to repeat them in the backward order 4 2 1 5 8 /2

Read list of letters. The subject must tap with his hand at each letter A. No points if 2 errors F B A C M N A A J K L B A F A K D E A A A J A M O F A A B /1

Serial 7 subtraction starting at 100 99 86 79 72 65 /3

4 or 5 correct subtractions: 3 pts, 2 or 3 correct: 2 pts, 1 correct: 1 pt, 0 correct: 0 pt

LANGUAGE

Repeat: I only know that John is the one to help today. /2

The cat always hid under the couch when dogs were in the room. /2

Fluency / Name maximum number of words in one minute that begin with the letter F (N 2: n words) /1

ABSTRACTION

Similarity between e.g. banana - orange - fruit train - bicycle watch - ruler /2

DELAYED RECALL

Has to recall words WITH NO CUE FACE VELVET CHURCH DAISY RED Points for UNCLUED recall only /5

Optional Category cue Multiple choice cue

ORIENTATION

Date Month Year Day Place City /6

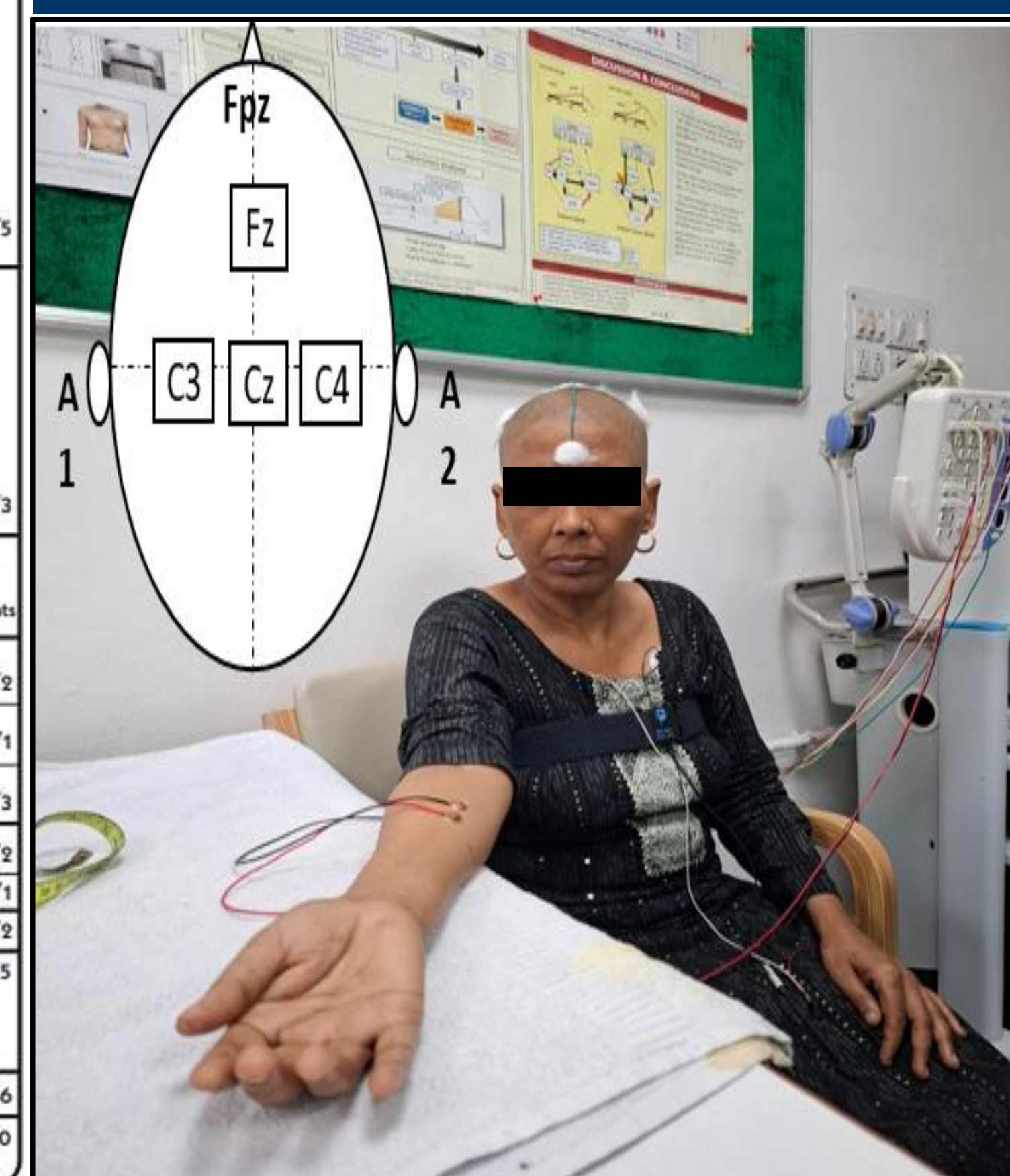
© Z. Nasreddine MD Version November 7, 2004 Normal 28/30 Add 1 point if ≤ 12 yr edu /30

www.mocatest.org

Motor-related cortical potentials (MRCP)

- Measure of motor cognition and planning
- Measured using **Nihan- Kohden MEB-2300**

Fig 2: Placement of electrodes for MRCP



fNIRS: functional near-infrared spectroscopy

- Measures hemodynamic responses in the frontal cortex during the go-no go assessment task across three time points
- Changes in oxygenated hemoglobin (HbO) and deoxygenated hemoglobin (HbR) were measured across 16 optodes.

Fig 4: Optodes placement

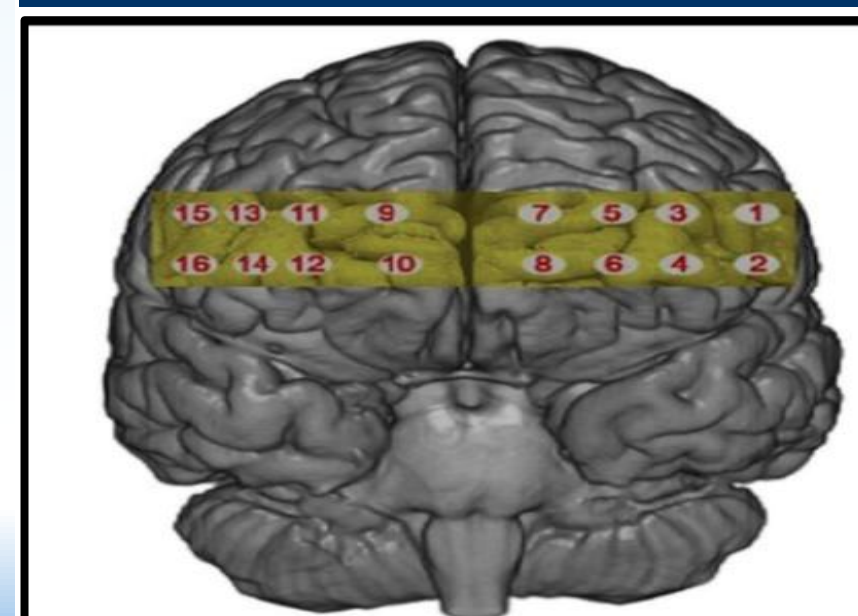
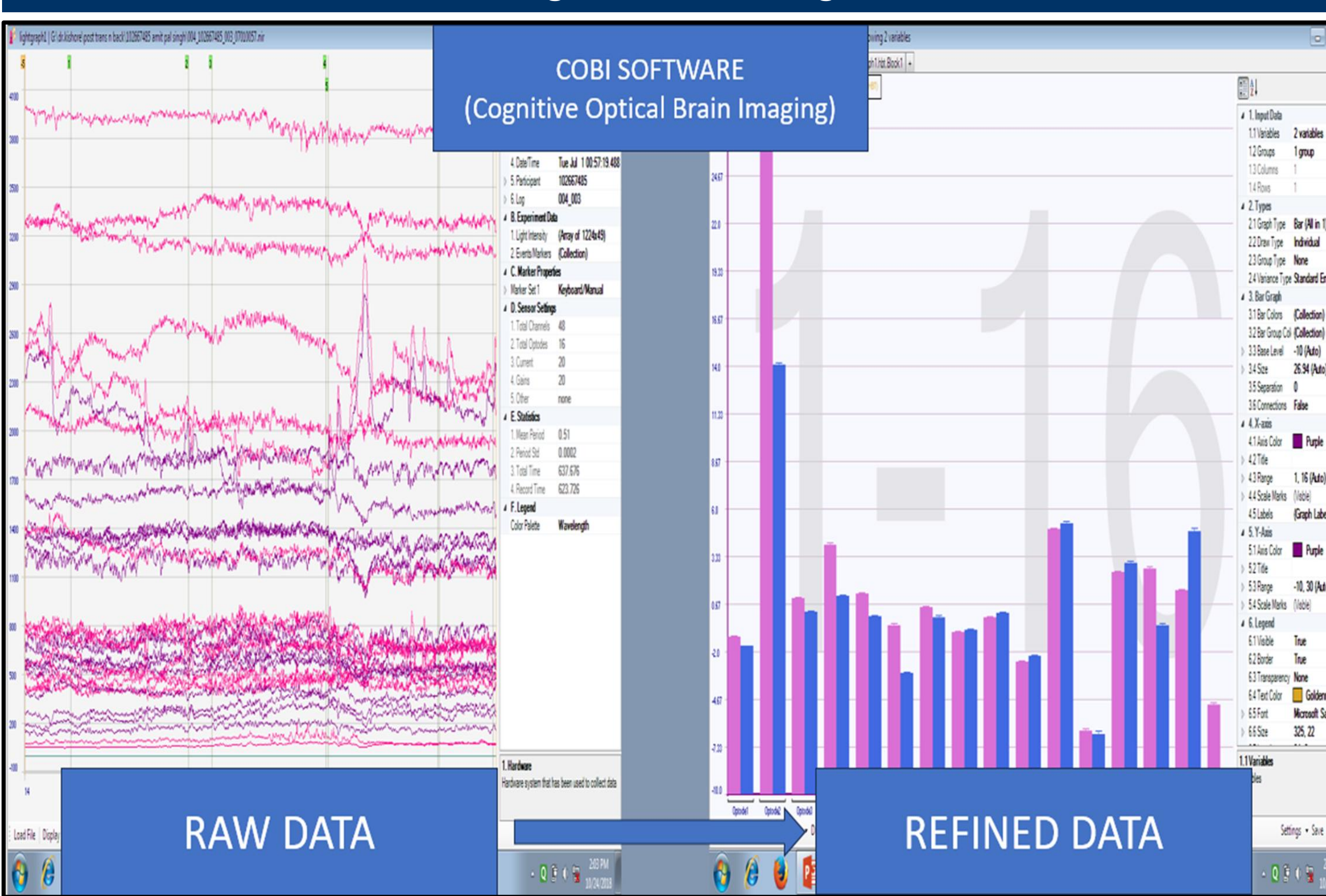
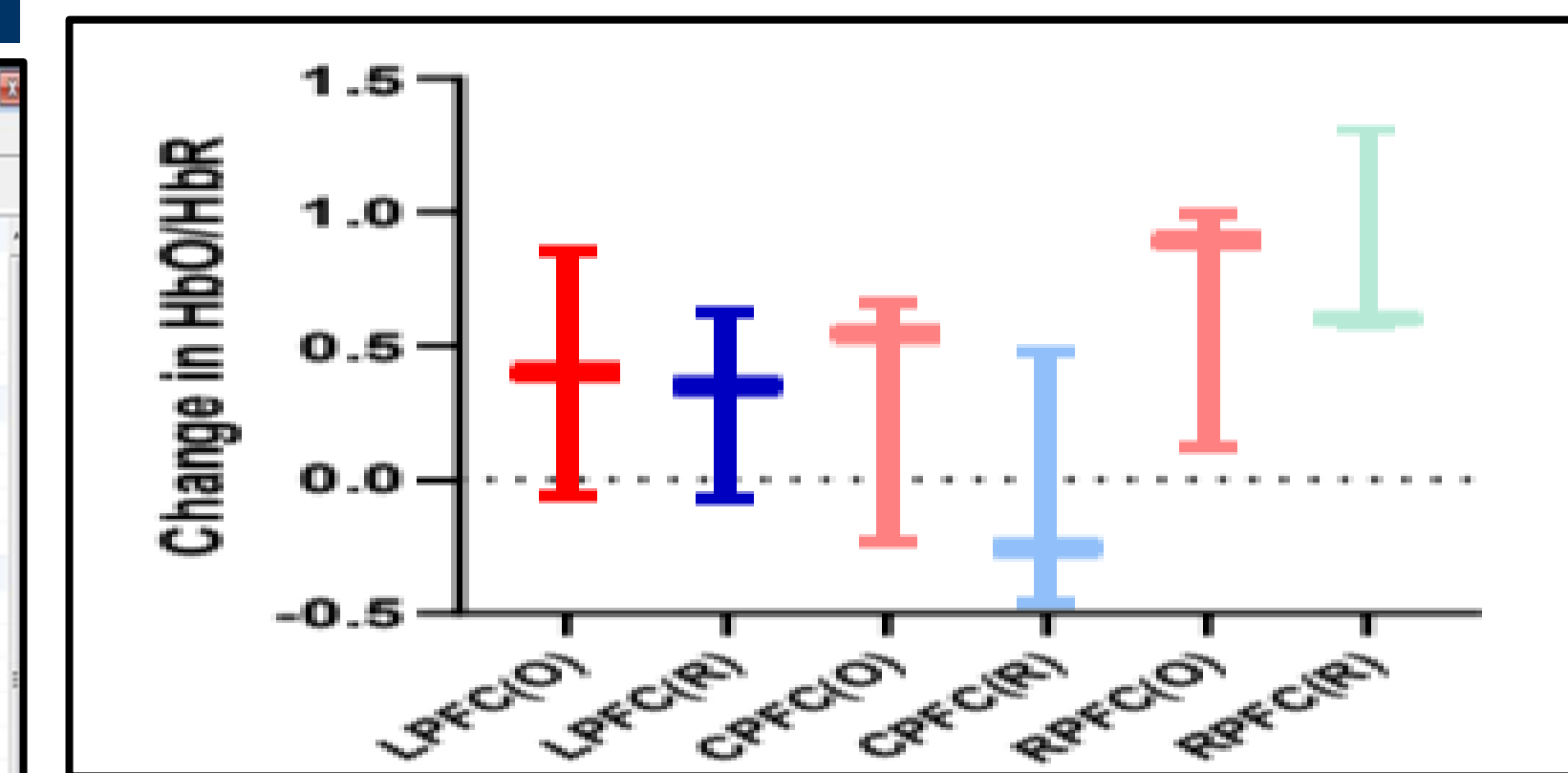


Fig 3: fNIRS Reading



Results- fNIRS

	LPFC (O)	LPFC (R)	CPFC (O)	CPFC (R)	RPFC (O)	RPFC (R)	P value
At Diagnosis	0.852255	-0.07245	-0.23507	0.46263	0.117696	0.602963	0.26
First follow-up	-0.05567	0.629067	0.6606	-0.2552	0.990133	1.309694	
Second follow-up	0.403333	0.348596	0.543829	0.48	0.896316	0.574235	



Non-significant reduction in brain oxygen uptake indicated by greater decline in de-oxygenated hemoglobin values than oxygenated hemoglobin

Discussion

- Wang et al. [1]** found that 72.38% of newly diagnosed ovarian cancer patients showed cognitive impairment, with a mean MoCA score of 23.11 ± 4.5, especially in **delayed recall and executive functions**.
- Correa et al. [2]** observed **reduced brain activation and poorer attention, memory, and executive performance** in patients with gynecological cancers compared to healthy controls.
- Kochhar et al. [3]** reported **flatter brain potential waveforms in Parkinson's patients**, with early amplitude changes and later latency alterations as disease severity increased. Changes were most pronounced at the Cz electrode site. There are no known studies on ovarian cancer yet

Conclusion

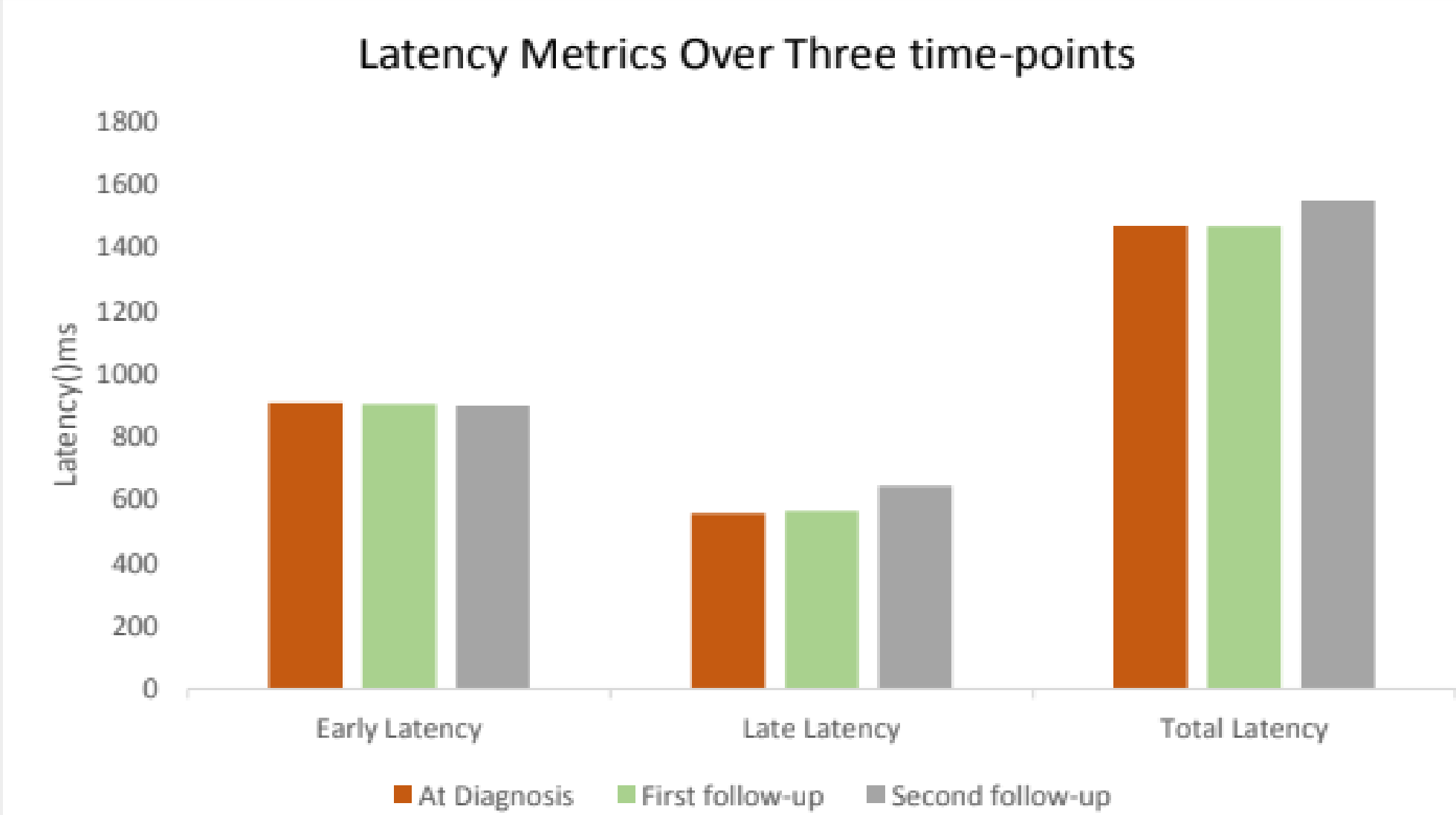
- This prospective pilot study provides **comprehensive insights** into the cognitive function of patients with ovarian cancer undergoing chemotherapy.
- Further studies are required due to **multifaceted mechanisms of chemo-brain** and development of targeted therapies.

References

- Wang L, et al. The association between neuropsychological impairment, self-perceived cognitive deficit, symptoms, and health-related quality of life in newly diagnosed ovarian cancer patients. Asia Pac J Oncol Nurs. 2024
- Correa H, Gaidica M, Braidy N, et al. Brain structure and function in patients with ovarian cancer treated with first-line chemotherapy: a pilot study. Brain Imaging Behav. 2017
- Kochhar K. Bereitschafts potentials as a Tool to Study Motor Neuroscience. Int J Sci Res 2015.

Results- MRCP

Mean±SD	At diagnosis	First follow-up	Second follow-up	p value
Early latency(ms)	908.29±110.54	905±66.6	900±63.8	0.9
Late latency(ms)	556.7±116.6	564±110.8	644±82.3	0.01
Total latency(ms)	1470.3±113.7	1468.8±100.4	1549.5±61.1	0.01



- Total latency significantly increased between the first and second follow-up (p = 0.03).**
- Early latency:** Initial phase of cortical activation showed an increasing trend- not statistically-significant (p = 0.9).
- Late latency** showed significant increase observed across the three time points (p = 0.01)