



# POST-TREATMENT COGNITIVE FUNCTION AND QUALITY OF LIFE ASSESSMENT COMPARING BETWEEN PRIMARY CENTRAL NERVOUS SYSTEM LYMPHOMA AND NON-CNS LYMPHOMA

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## INTRODUCTION

Primary Central Nervous System Lymphoma (PCNSL) survivors usually experience cognitive impairments, particularly in attention and executive function, caused by treatments and prior CNS lesions which affect their quality of life. This study aims to compare the post-remission cognitive functions and health-related quality of life (HRQoL) between high-dose methotrexate treated PCNSL patients and other types of lymphoma without CNS disease patients.

## METHODS

Twenty patients with PCNSL in complete remission and twenty non-CNS lymphoma survivors who were treated between 2016 and 2024 were enrolled. Neurocognitive assessments include Montreal Cognitive Assessment (MOCA) test, digit span test, symbol search, and Wisconsin card sorting test-short form (WCST-64). The HRQoL was evaluated by using EORTC QLQ-C30 and EORTC QLQ-BN20 questionnaires.

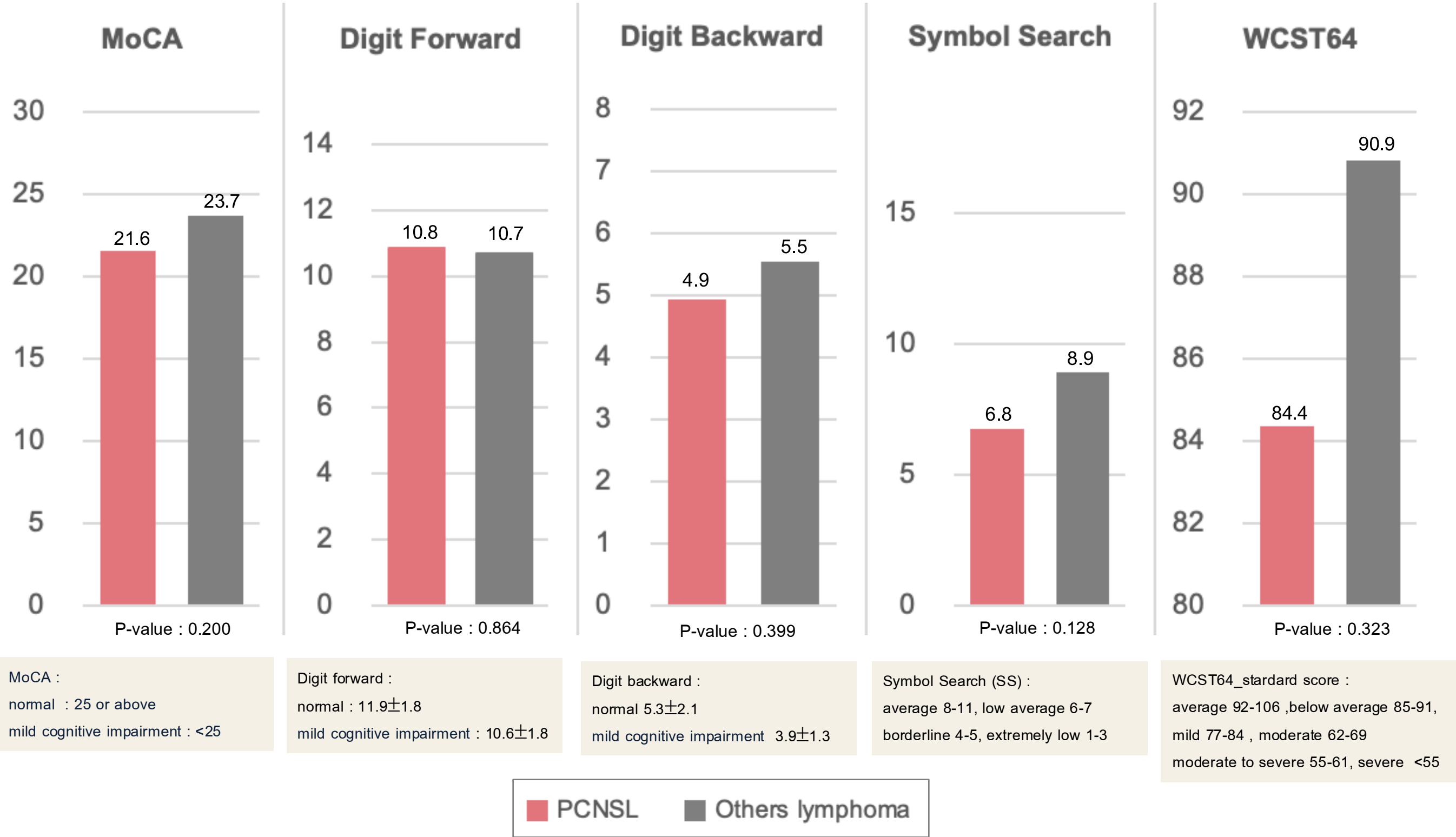
## RESULTS

| Variable                              | PCNSL (N=20)  | Other Lymphoma (N=20) | P-value      |
|---------------------------------------|---------------|-----------------------|--------------|
| <b>Age , (years)</b>                  |               |                       | <b>1.00</b>  |
| Median, Range                         | 59.75 (34-87) | 60 (42-78)            |              |
| 60 and above, n(%)                    | 10 (50)       | 10 (50)               |              |
| <60 , n(%)                            | 10 (50)       | 10 (50)               |              |
| <b>Education level, n(%)</b>          |               |                       | <b>0.343</b> |
| < Bachelor's degree                   | 9 (45)        | 11 (55)               |              |
| Bachelor's degree and above           | 11 (55)       | 9 (45)                |              |
| <b>ECOG, n(%)</b>                     |               |                       | <b>0.593</b> |
| 0                                     | 12 (60)       | 17 (85)               |              |
| 1-2                                   | 8 (40)        | 3 (15)                |              |
| <b>Sex, n(%)</b>                      |               |                       | <b>0.492</b> |
| Male                                  | 6 (30)        | 11 (55)               |              |
| female                                | 14 (70)       | 9 (45)                |              |
| <b>Disease site, n(%)</b>             |               |                       | <b>**</b>    |
| Non deep structure                    | 9 (45)        | -                     |              |
| Deep structure                        | 11 (55)       | -                     |              |
| <b>Chemotherapy ,n(%)</b>             |               |                       |              |
| HD-MTX                                | 3 (15)        | -                     |              |
| R-HD-MTX                              | 1 (5)         | -                     |              |
| HD-MTX/ifosfamide                     | 6 (30)        | -                     |              |
| R-HD-MTX/ifosfamide                   | 10 (50)       | -                     |              |
| <b>Radiotherapy ( WBRT )</b>          |               |                       |              |
| No, n(%)                              | 4 (20)        | -                     |              |
| Yes, n(%)                             | 16 (80)       | -                     |              |
| - 23.4 Gy                             | 6/16          | -                     |              |
| - 30.6 – 36 Gy                        | 10/16         | -                     |              |
| <b>Time (remission to evaluation)</b> |               |                       | <b>0.329</b> |
| Median, years (range)                 | 37 (1-114)    | 14(1-49)              |              |
| < 12 month , n(%)                     | 6 (30)        | 10 (50)               |              |
| 12-24 month, n(%)                     | 3 (15)        | 7(35)                 |              |
| >=24 month, n(%)                      | 11 (55)       | 3 (15)                |              |
| <b>MoCA screening</b>                 |               |                       | <b>0.251</b> |
| 25 and above, n (%)                   | 7 (35)        | 8 (40)                |              |
| below 25, n (%)                       | 13 (65)       | 12 (60)               |              |

### Participant

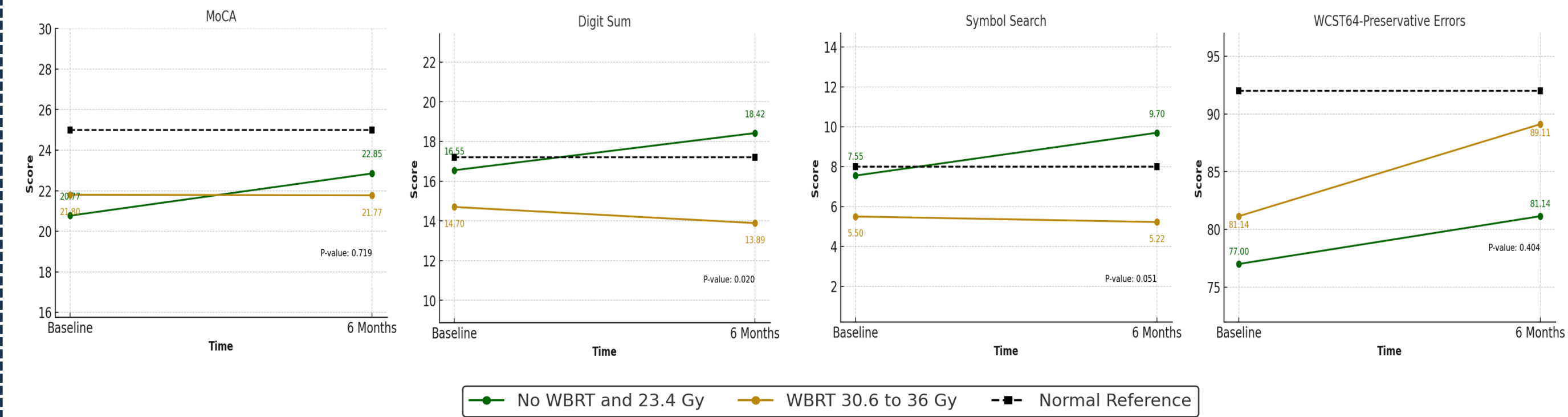
The median age of PCNSL and non-CNS lymphoma survivors were 60 (range 34-87) and 60 (range 42-78) years old, respectively. Fifty percent of patients in both groups were aged ≥60 years. The education level at a bachelor's degree and beyond was found in 55% of PCNSL patients and 45% of non-CNS lymphoma patients. The median duration from complete remission to cognitive/HRQoL assessment was 37 months in PCNSL group and 14 months in control group. Eighty percent of PCNSL patients received whole brain radiotherapy. ECOG performance scores did not show the difference between groups.

### Cognitive function



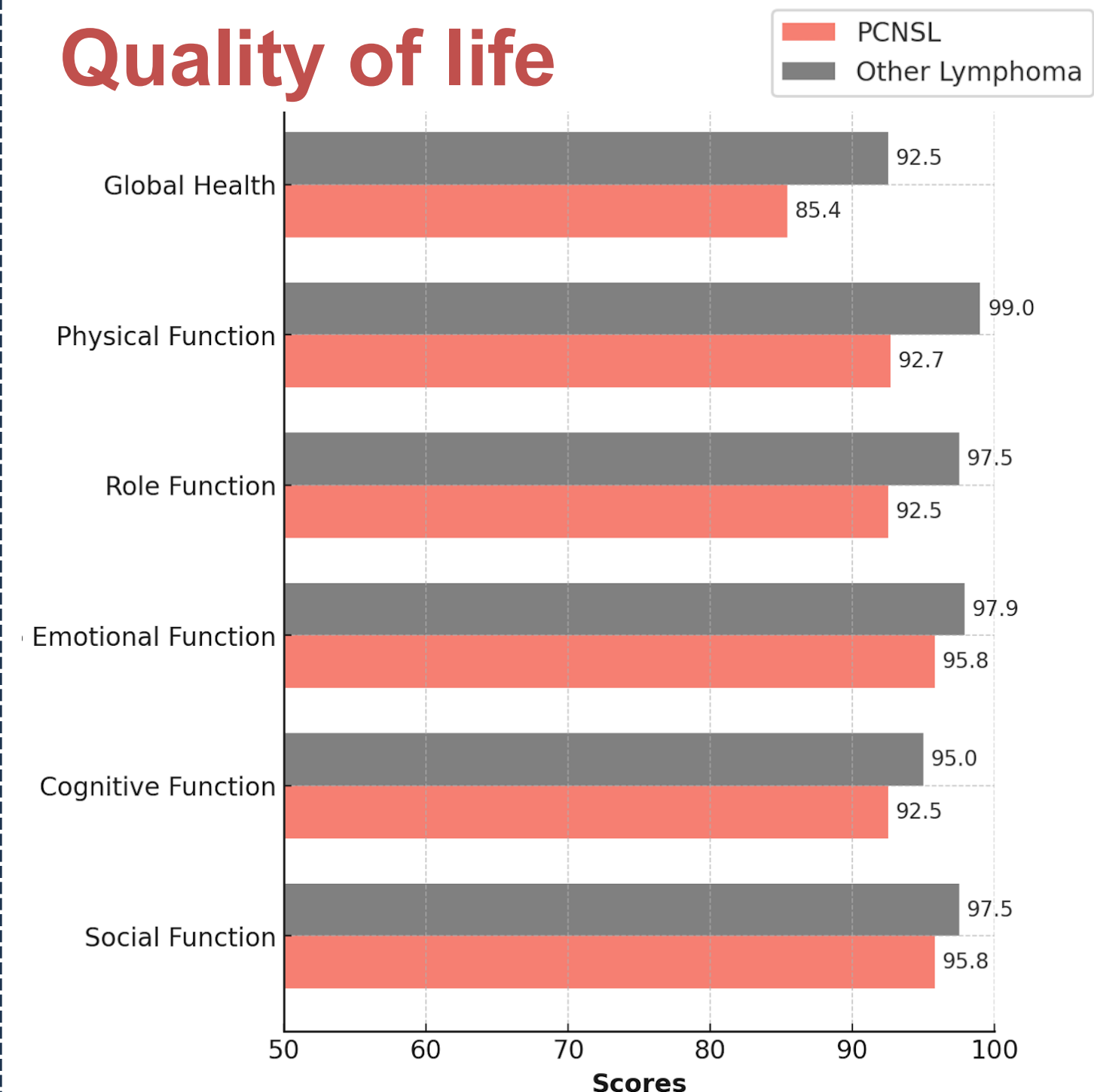
No difference in the mean MOCA score between PCNSL and non-CNS lymphoma patients was detected (21.57 vs. 23.7, p=0.200). Using MOCA test, 63% of PCNSL patients and 60% of non-CNS lymphoma patients were identified as mild cognitive impairment. Comparing PCNSL and non-CNS lymphoma groups, Attention-dependent functions measured by Digit Forward (10.84 vs 10.70) and Digit Backward (4.94 vs 5.55), were not significantly different across groups (p>0.05). PCNSL patients had lower scores in visuospatial attention using the Symbol Search test without significant difference (6.77 vs 8.90, p=0.128). For executive function, assessed using the Wisconsin Card Sorting Test (WCST), demonstrated mild cognitive deficits in PCNSL patients, particularly in perseverative errors (83.47 vs 90.95) without significant difference.

### Impact of WBRT on Cognitive Function



Patients who received WBRT at doses of 30.6-36 Gy had lower cognitive function scores compared to those receiving 23.4 Gy or no WBRT. Attention-dependent function (digit span) showed a decline with increasing WBRT dose, reaching statistical significance. (p=0.020) Executive function scores (WCST64) were lower in patients receiving higher WBRT doses, but there was no statically significance (p=0.404).

### Quality of life



The HRQoL showed no significant difference in any domains. However, PCNSL patients had lower mean score of functional scale including social, cognitive, emotional, role and physical function comparing with others lymphoma.

## CONCLUSION

PCNSL survivors may increase the rate of cognitive impairment specifically in visuospatial attention or executive function, without affecting HRQoL compared to non-CNS lymphoma survivors. A larger study is needed