Preserved Neurochemical Balance in the Aging Cerebellum Despite Motor Performance Declines

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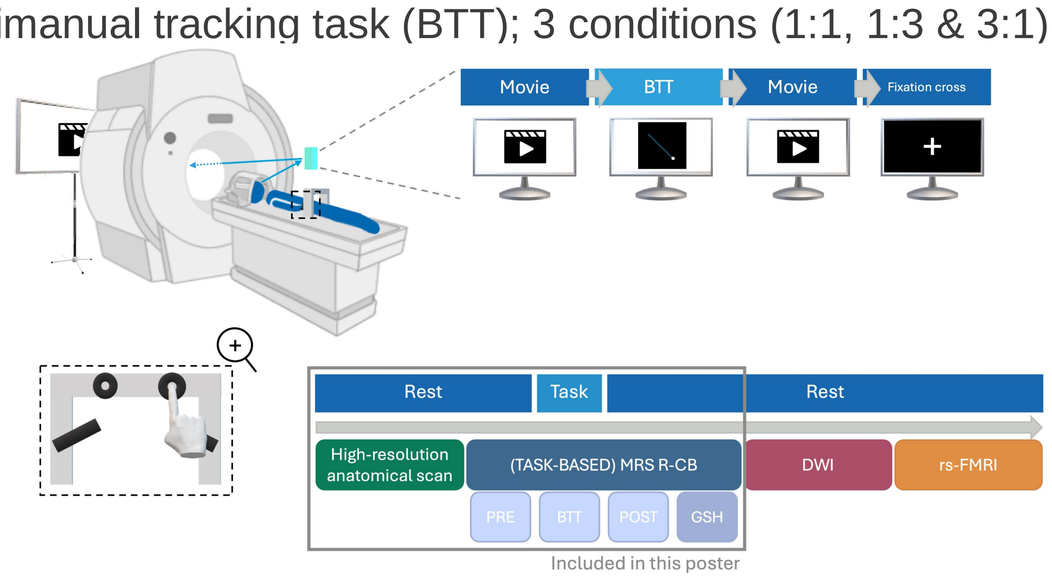
INTRODUCTION

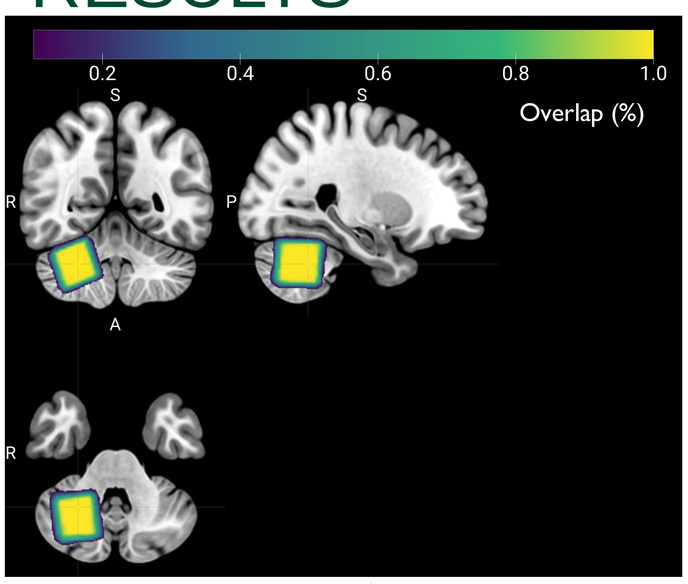
- The **cerebellum** plays a critical role in motor control, coordination, and learning[1,2,3].
- **Age-related atrophy** of cerebellar gray and white matter is linked to **declines in motor performance**[1].
- Neurochemical alterations, such as changes in **gamma-aminobutyric acid (GABA)** and **glutamine (measured in combination with glutamate; Glx)** levels, may contribute to age-related motor impairments. However, this has never been investigated in the context of aging.
- Additionally, the role of **glutathione (GSH),** a key antioxidant, remains underexplored in the cerebellum.

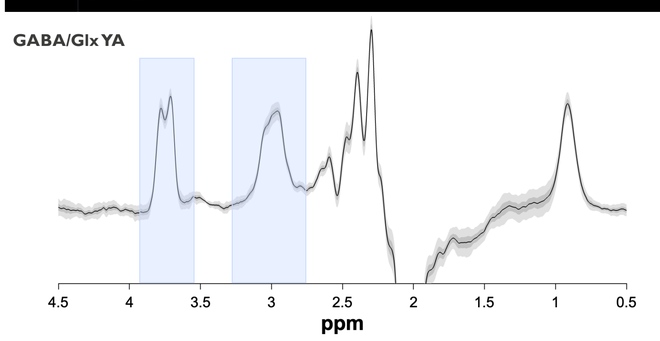
METHODS

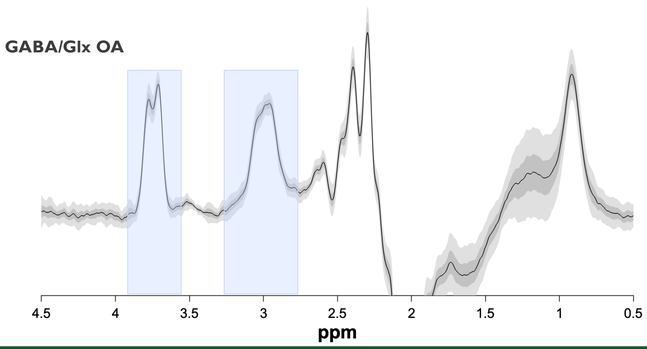
- 25 younger (YA; age 25±5) and 25 older adults (OA; age 68±5)
- Magnetic resonance spectroscopy (MRS) using MEGA-PRESS
- GABA, Glx and GSH levels in the right cerebellar hemisphere
- Bimanual tracking task (BTT); 3 conditions (1:1, 1:3 & 3:1)



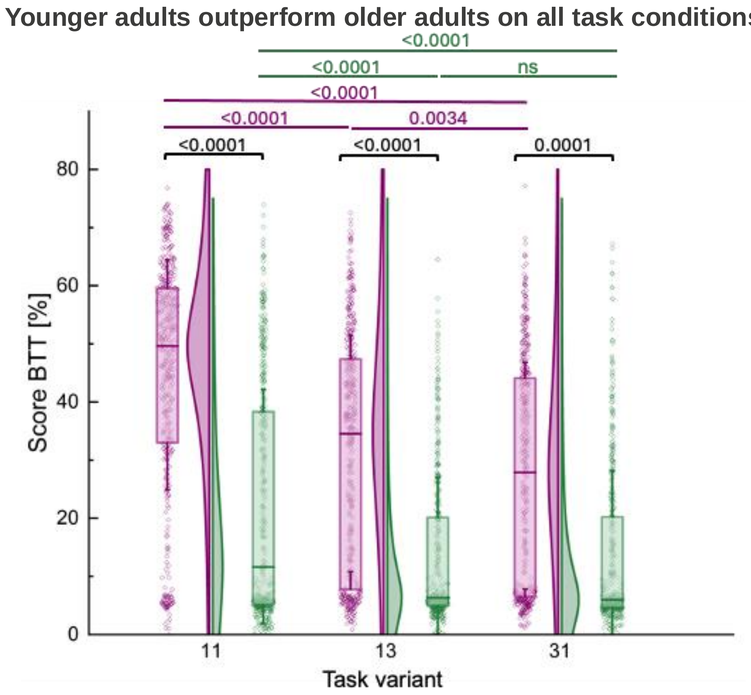
RESULTS



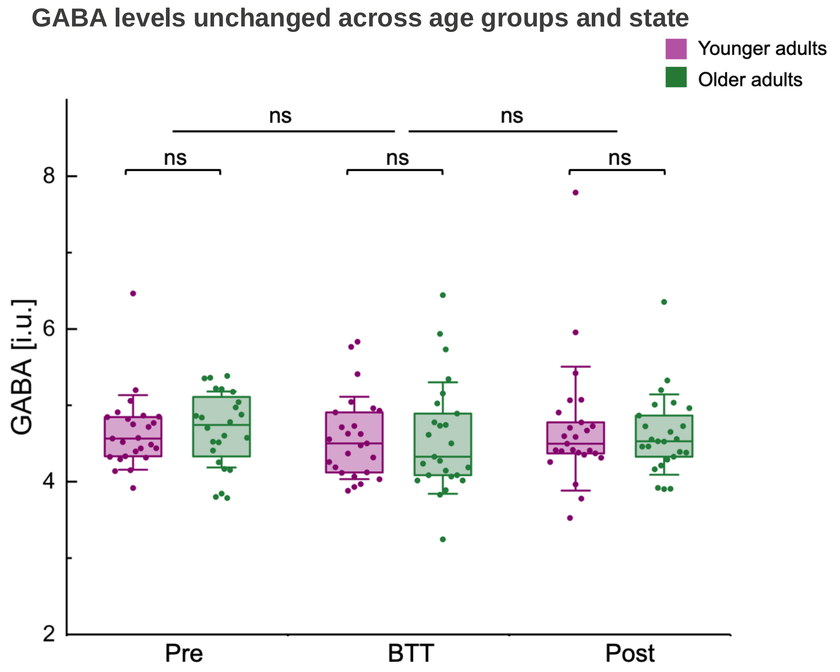




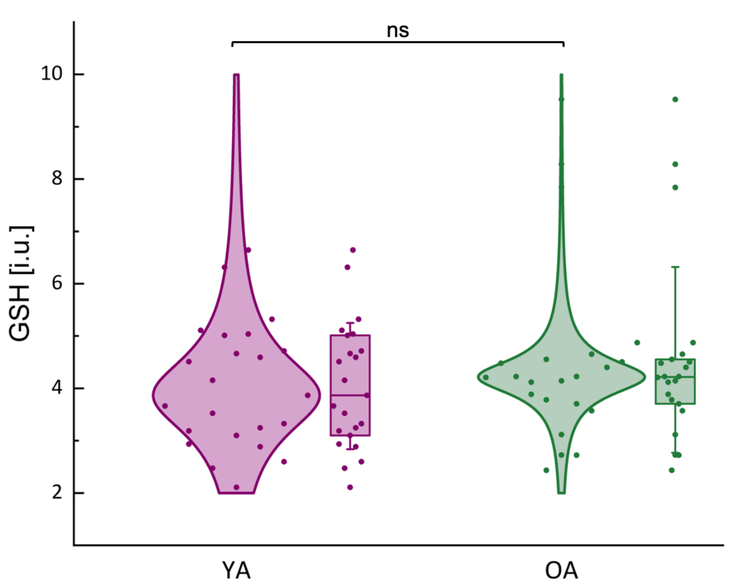
Younger adults outperform older adults on all task conditions



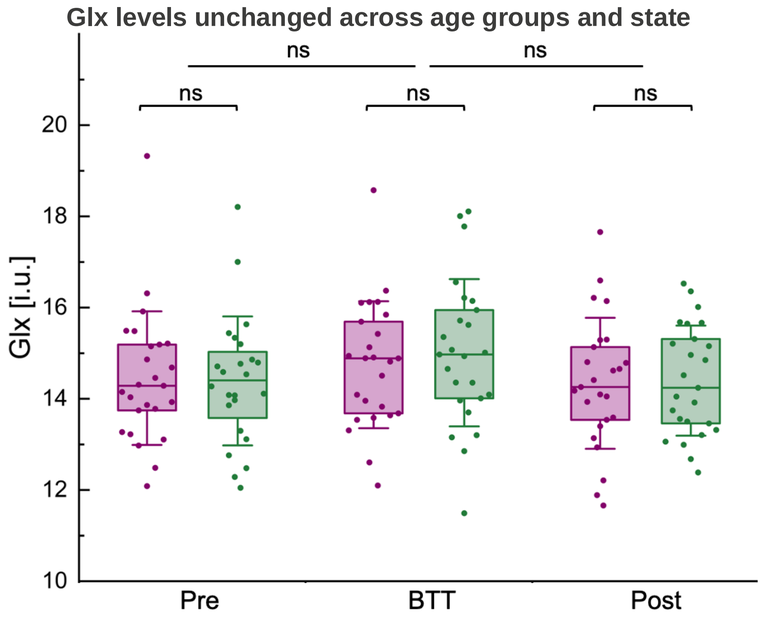
GABA levels unchanged across age groups and state



No difference in GSH between age groups



Glx levels unchanged across age groups and state



CONCLUSION

- Our findings indicate no significant age-related differences in cerebellar GABA, Glx, or GSH levels, due to the specificity in brain region demonstrating neurometabolic changes.
- Moreover, age-related cerebellar dysfunction might arise from mechanisms beyond the neurometabolite levels measured in this study, such as changes in norepinephrine modulation or electrophysiological alterations in Purkinje cells.
- These findings highlight the complexity of age-related cerebellar changes.

CONTACT

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