

# Temporal Muscle Thickness: A Practical Approximation for Assessing Muscle Mass in Older Adults

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## Background

Ongoing research has evidenced the importance of muscle measurement in predicting adverse outcomes. Measurement of other muscles is promising in current research.

## Aim

This study aimed to determine the correlation between temporal muscle thickness (TMT) and appendicular lean soft tissue (ALSTI) in older adults.

## Materials and Methods

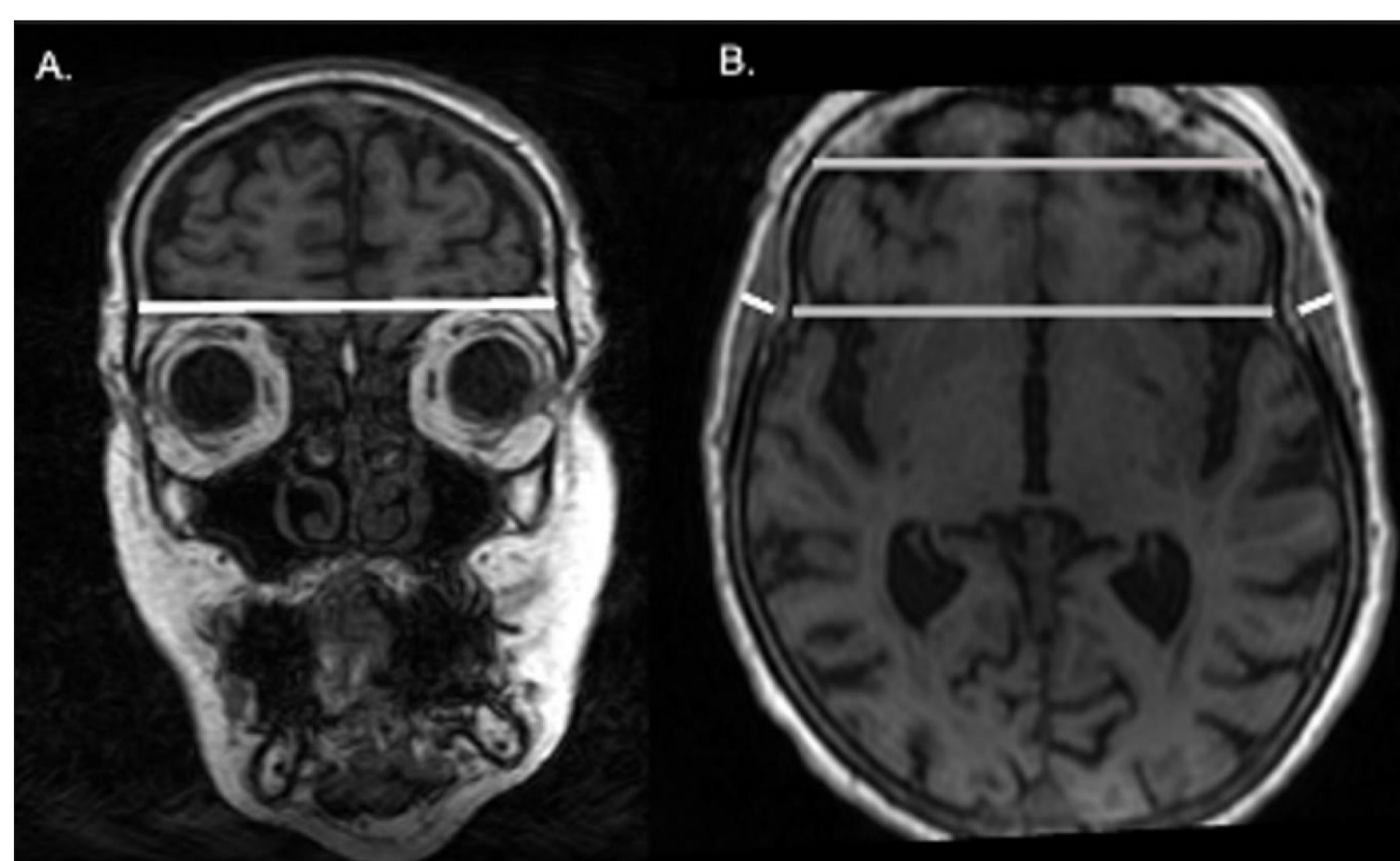
**Design:** Cross-sectional study.

**Settings and Participants:** Single cohort gathered in Gothenburg, Sweden, consisting of individuals born in 1944.

**Methods:** We studied 657 magnetic resonance images to measure TMT. Comparisons of TMT with dual-energy X-ray absorptiometry ALSTI (kg/m<sup>2</sup>) as a reference standard were performed. Finally, TMT associations with cognition evaluated using the Mini-Mental State Examination (MMSE), gait speed, and handgrip strength were explored with linear regressions.

**Figure 1.** Measure of TMT in one of the participants. A representative case for the assessment of the TMT on MRI

- Coronal view of the brain. The TMT was measured on the right and left sides separately in all patients, perpendicular to the long axis of the temporalis muscle.
- Axial view of the brain. The Sylvian fissure and orbit roof were used as points of reference for the measurement.



## Results

The correlation between TMT and ALSTI was weak yet significant ( $r = 0.277$ ,  $p < 0.001$ ), surpassing ALSTI's correlation with other physical measures. TMT exhibited significant associations with: MMSE (Est = 0.168,  $p = 0.002$ ), gait speed (Estimate = 1.795,  $p < 0.001$ ), and ALSTI (Estimate = 0.508,  $p < 0.001$ ). These associations varied when analyzed by sex.

In females, TMT was significantly associated with gait speed (Estimate = 1.857,  $p = 0.005$ ) and MMSE (Estimate = 0.223,  $p = 0.003$ ). In males, TMT significantly correlated with ALSTI (Estimate = 0.571,  $p < 0.001$ ).

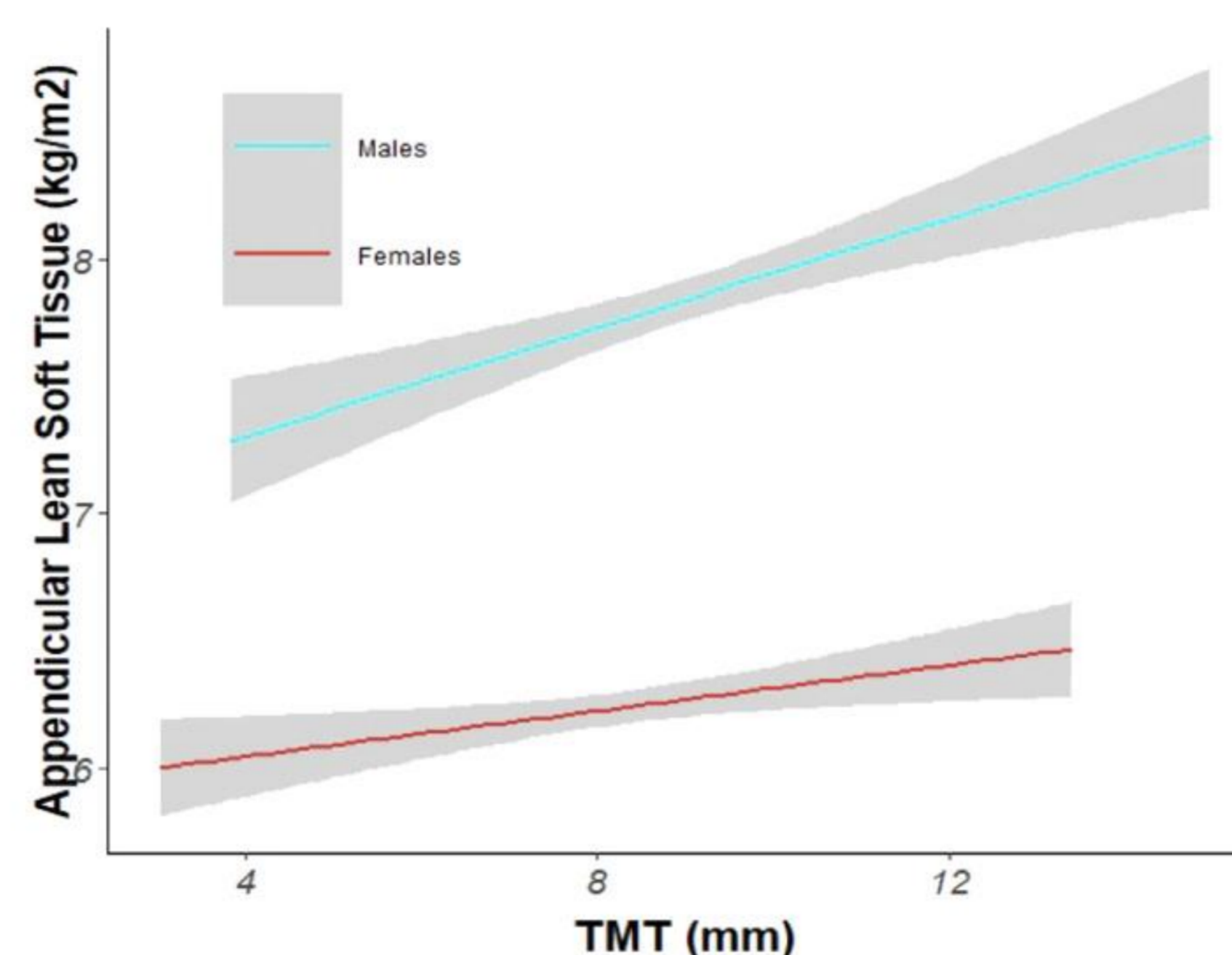


Figure 2. Correlation between ALSTI and TMT (mm) and appendicular lean soft tissue (kg/m<sup>2</sup>), Spearman's rho 0.277, P value < .001. Female Spearman's rho 0.136, P value 0.11; male Spearman's rho 0.262, P value < .001.

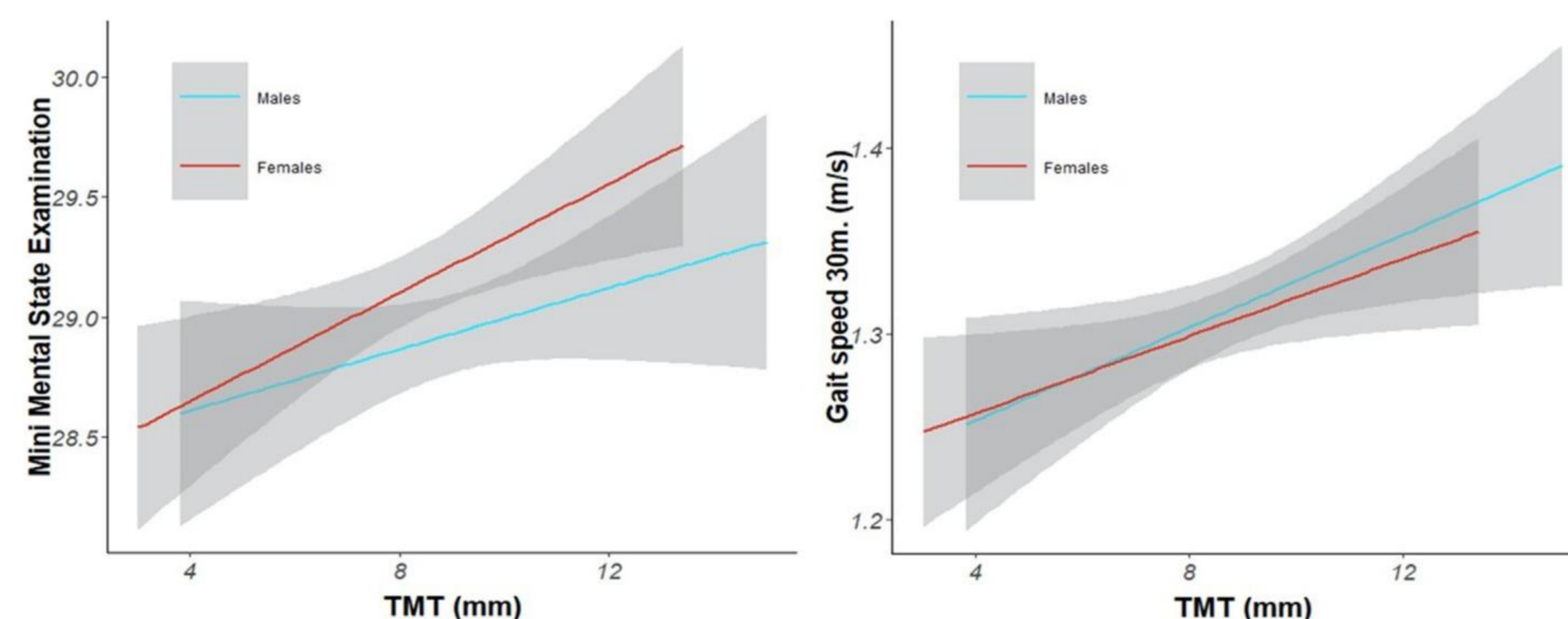


Fig. 3. Association of TMT with MMSE and gait speed. Graphical representation for all the samples divided by sex.

## References

- Borda, M. G., et al. (2022). "Tongue muscle mass is associated with total grey matter and hippocampal volumes in Dementia with Lewy Bodies." Archives of Gerontology and Geriatrics: 104647.
- Borda, M. G., et al. (2021). "Muscle volume and intramuscular fat of the tongue evaluated with MRI predict malnutrition in people living with dementia: a five-year follow-up study." J Gerontol A Biol Sci Med Sci.
- Katsuki, M, Kakizawa, Y, Nishikawa, A, et al. Temporal Muscle and Stroke-A Narrative Review on Current Meaning and Clinical Applications of Temporal Muscle Thickness, Area, and Volume. Nutrients 2022;14(3).
- Sadhvani, N, Aggarwal, A, Mishra, A, et al. Temporal muscle thickness as an independent prognostic marker in glioblastoma patients-a systematic review and meta-analysis. Neurosurg Rev 2022;45(6):3619-3628

## Conclusion

Repurposing head images can be an accessible alternative to detect muscle mass and ultimately detect sarcopenia. These studies have the potential to trigger interventions or further evaluation to improve the muscle and overall health of individual. However, additional research is warranted before translating these findings into clinical practice.