

Temporalis muscle thickness as a radiological biomarker for sarcopenia in older adults with mild cognitive impairment or subjective memory concerns

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Introduction

Sarcopenia is:

- A progressive, generalised, age-related skeletal muscle disorder involving the accelerated loss of¹:
 - Muscle strength
 - Muscle mass (quantity/quality)
 - Muscle function
- Associated with dementia, in particular Alzheimer's disease (AD)²
- Associated with an increased risk of adverse outcomes¹
 - Falls
 - Fractures
 - Hospitalisation
 - Residential aged care home admission
 - Mortality

Current guideline-recommended tools to diagnose sarcopenia¹, such as handgrip strength, sit-to-stand (STS) test, and to assess sarcopenia severity such as timed-up-and-go (TUG) test, are not commonly done in a diagnostic cognitive workup in memory clinics.

By contrast, brain magnetic resonance imaging (MRI) is commonly performed in a cognition assessment, and temporalis muscle thickness (TMT) has been suggested as a potential sarcopenia biomarker. TMT has been used as a surrogate biomarker for sarcopenia in mild dementia³, Parkinson's disease⁴ and stroke⁵.

This study evaluated if TMT was a useful sarcopenia diagnostic tool in people aged ≥ 65 years with mild cognitive impairment (MCI) or subjective memory concerns (SMC). We determined if:

- (1) TMT correlates with guideline-recommended sarcopenia tools
- (2) TMT was associated with beta-amyloid (A β) positivity
- (3) A β positivity correlated with guideline recommended sarcopenia tools

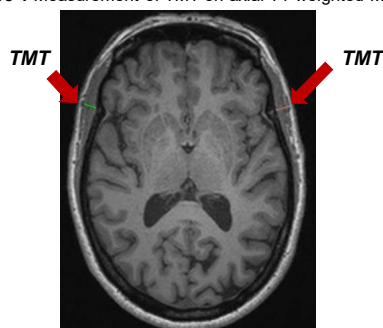
Methods

- Retrospective study of older adults with MCI/SMC in the Australian Imaging, Biomarker and Lifestyle (AIBL) active study⁶.
- Participants underwent brain MRI, A β positron electron tomography (PET), and sarcopenia assessments (handgrip strength, STS, TUG) following recommended guidelines at baseline visit.
- TMT was measured on axial T1-weighted MRIs bilaterally perpendicular to the long-axis of the temporalis muscle using the orbital roof and Sylvian fissure as anatomical landmarks (Figure 1, arrow), and mean TMT was used for analysis.
- A β positivity defined as greater than 20 Centiloids.
- Sarcopenia defined per 2019 European working group on sarcopenia in older people criteria (EWGSP2)¹.

Analysis:

- Pearson correlation assessed the relationship between TMT and sarcopenia assessments
- Multivariable linear regression, adjusting for age and sex assessed the association between
 - TMT and A β positivity
 - A β positivity and sarcopenia assessments

Figure 1 Measurement of TMT on axial T1-weighted MRI



Results

Table 1 Baseline characteristics

	(n = 91)
Age, years	73.5 $\pm$ 5.8
Female	50 (55)
Body Mass Index	26.7 [24.6 – 29.1]
MMSE	28.6 $\pm$ 1.4
Sarcopenia	1 (1)
A β positivity	26 (29)
Handgrip strength, kilograms	31.8 [26.0 – 39.5]
Sit-to-stand test, seconds	10.3 [9.2 – 12.5]
Timed-up-and-go test, seconds	6.2 [5.2 – 7.5]
TMT, mm	7.5 $\pm$ 1.5

Data are presented as mean $\pm$ standard deviation, median [interquartile range], or number (percentage). MMSE = Mini-mental state examination

Table 2 Correlation between TMT and sarcopenia assessments

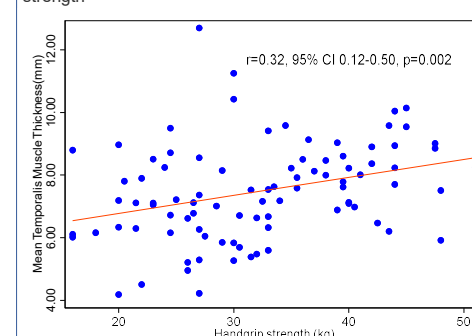
	r (95% CI)	p-value
Handgrip strength	0.32 (0.12 – 0.50)	0.002
Sit-to-stand test	-0.15 (-0.35 – 0.05)	0.145
Timed-up-and-go test	-0.07 (-0.21 – 0.21)	0.486

r = Pearson correlation coefficient, CI = confidence interval

- There was no association between TMT and A β positivity.
- There was no association between A β positivity and sarcopenia assessments (handgrip strength, STS, TUG).

Results

Figure 1 Weak correlation between TMT and handgrip strength



Discussion

- These findings suggest that MRI-based assessment of TMT could be a practical tool to diagnose probable sarcopenia in people with MCI or SMC.
- Automated artificial intelligence-based tools should be considered for an efficient, accurate and reliable method to assess TMT in brain MRIs.
- Limitations include small sample size, single site and a low number of participants with sarcopenia.
- Future studies should explore the relationship between TMT and long-term clinical and functional outcomes and whether TMT could be used to identify patients with probable sarcopenia for interventional trials.

Conclusions

- TMT correlated with handgrip strength in a cohort of older adults with MCI/SMC.
- TMT was not associated with A β positivity.
- A β positivity did not correlate with guideline recommended sarcopenia tools.

References

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