

# Clinical and Neuroimaging Characterization of Primary Progressive Aphasia Variants: A Focus on Logopenic Variant (lvPPA)

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## INTRODUCTION

- Primary Progressive Aphasia (PPA) is a neurodegenerative syndrome characterized by progressive impairment of language functions. The logopenic variant (lvPPA) is distinguished by deficits in auditory-verbal short-term memory, leading to impaired repetition, a core diagnostic feature of the syndrome<sup>1</sup>.
- The aim of this study was to investigate the relationship between language performance and cortical thickness in lvPPA using structural MRI.

## METHODS

- Twenty-eight participants (14 lvPPA, 14 healthy controls) were enrolled. Structural MRI data were processed using the CAT12.9 (r2577) pipeline, and cortical thickness was extracted based on the Desikan–Killiany atlas. Participants completed a comprehensive neuropsychological assessment focusing on naming and repetition. Group comparisons were performed using ANCOVA, and partial correlation analyses were conducted controlling for education.

**Table1.** Demographic and Clinical Characteristics of the Participants

|              | lvPPA<br>(n=14)<br>Mean±S.D | HC<br>(n=14)<br>Mean±S.D. | p.<br>values       |
|--------------|-----------------------------|---------------------------|--------------------|
| Age          | 65,67 ± 8,46                | 66,14 ± 5,55              | ,834 <sup>a</sup>  |
| Gender (F/M) | 12/2                        | 12/2                      | 1,00 <sup>b</sup>  |
| Education    | 7,93 ± 4,55                 | 13,21 ± 4,12              | ,008 <sup>c*</sup> |
| MMSE         | 20,07 ± 5,02                | 29,43 ± 0,85              | ,000 <sup>a*</sup> |
| BNT          | 25,29 ± 2,76                | 30,57 ± 0,65              | ,000 <sup>a*</sup> |
| ADD Total    | 255,0 ± 21,61               | 288,79 ± 2,7              | ,000 <sup>a*</sup> |

lvPPA: Logopenic Variant of Primary Progressive Aphasia, HC: Healthy Controls; S.D.: Standard Deviations; F: Female, M:Male; MMSE: Mini Mental Examination Test, BNT: Boston Naming Test, ADD Total: The Aphasia Language Assessment Test; a: Independent Sample t-test; b: Chi-Square test, c: Mann-Whitney U test.

## RESULTS

### Structural MRI

- Reduced left STG cortical thickness in lvPPA vs. controls (p<0.001).

### Language–brain relationship

- Left STG thickness positively correlated with naming and repetition<sup>2</sup> (both p=0.005).No significant correlations for right STG.

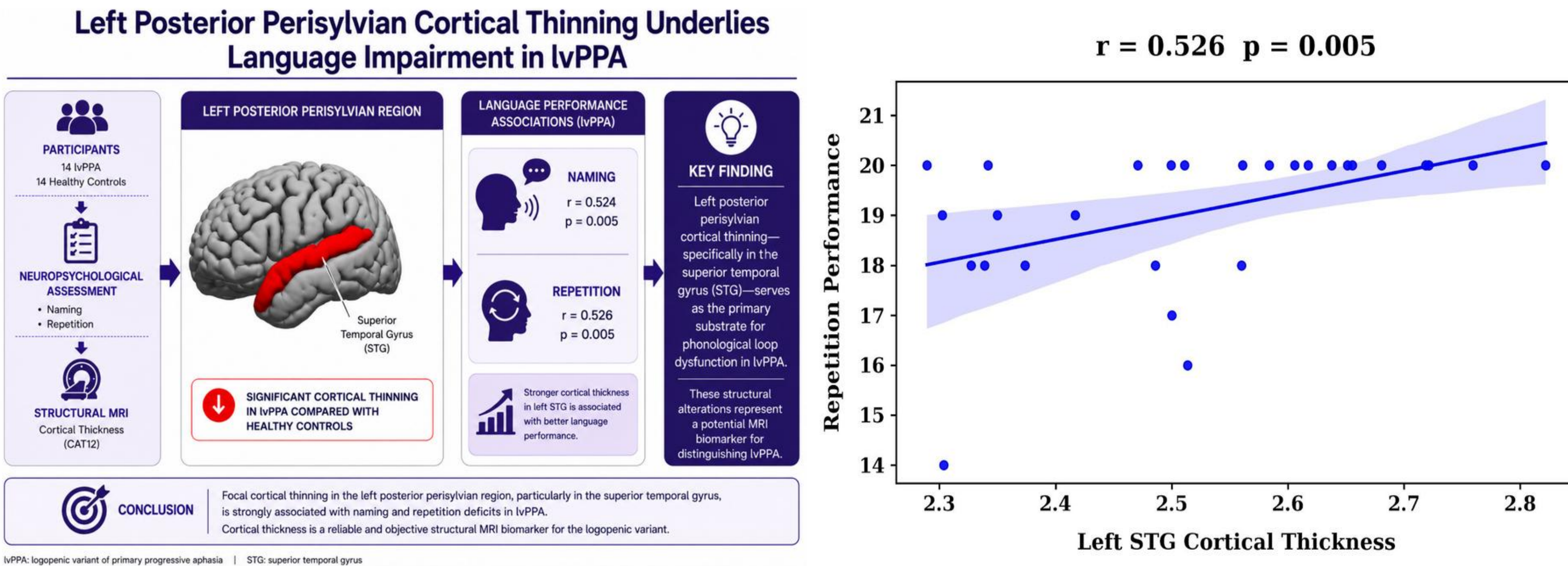


**Figure 1.** Schematic workflow and main findings.

**Figure 2.** Correlation between left STG thickness and repetition performance.

## CONCLUSIONS

- Left STG and SMG cortical thinning is associated with language impairment in lvPPA and supports the use of cortical thickness as a potential MRI biomarker.

## REFERENCES

[1] Gorno-Tempini, M. L., Hillis, A. E., Weintraub, S., Kertesz, A., Mendez, M., Cappa, S. F., ... & Grossman, M. (2011). Classification of primary progressive aphasia and its variants. *Neurology*, 76(11), 1006-1014.

[2] Toğram, B., & Maviş, İ. (2012). Afazi Dil Değerlendirme Testi'nin Geçerlik, Güvenirlik ve Standardizasyon Çalışması. *Turkish Journal of Neurology/Türk Noroloji Dergisi*, 18(3).

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