

Automated CT-based Brain Volumetry for Resource-limited Settings

Laura Willers de Souza ^{1,2}, Marco Antônio de Bastiani ², Giordana Salvi de Souza ², Marcelo Carneiro ³, Rochele Mosmann Menezes ³, Andrei Bieger ², Guilherme Povala ⁴, Artur Martins Novaes Coutinho ^{5,6}, Wyllians Vendramini Borelli ², Eduardo Zimmer ², Mateus Rozalem Aranha ^{6,7}, Guilherme G. Shu Peixoto ¹

¹ masima: Macunaíma Soluções em Imagens Médicas, Brazil; ² Universidade Federal do Rio Grande do Sul, Brazil; ³ Universidade de Santa Cruz do Sul, Brazil; ⁴ University of Pittsburgh, USA; ⁵ Hospital Sírío-Libanês, Brazil; ⁶ Universidade de São Paulo, Brazil; ⁷ Hospital de la Santa Creu i Sant Pau, Spain

INTRODUCTION



Acess to neuroimaging biomarkers for Alzheimer's disease remains highly unequal, with **MRI** widely available in high-resource settings but limited in resource-limited regions.



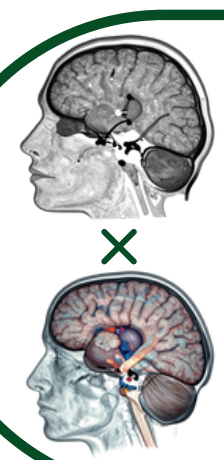
Computed Tomography (**CT**) is widely available worldwide, including in low-and middle-income regions.



This study whether automated **CT-based** volumetry can approximate **MRI-derived measurements** with sufficient reliability for cross-modality comparability.

METHODS

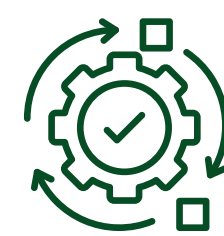
1



Paired CT & MRI Scans

• 31 subjects

2



Automated Segmentation

- Deep learning-based segmentation pipelines
- Regional volumes extracted from **101 brain regions**

3



Cross-Modality Agreement

- Pearson correlation
- Concordance Correlation Coefficient (CCC)
- **ICC (2,1)**
- Bland-Altman analysis

4



Quality Assessment

- Segmentation quality evaluated using QC metrics

5



Influential Observations

- Cook's distance used to identify influential observations

RESULTS

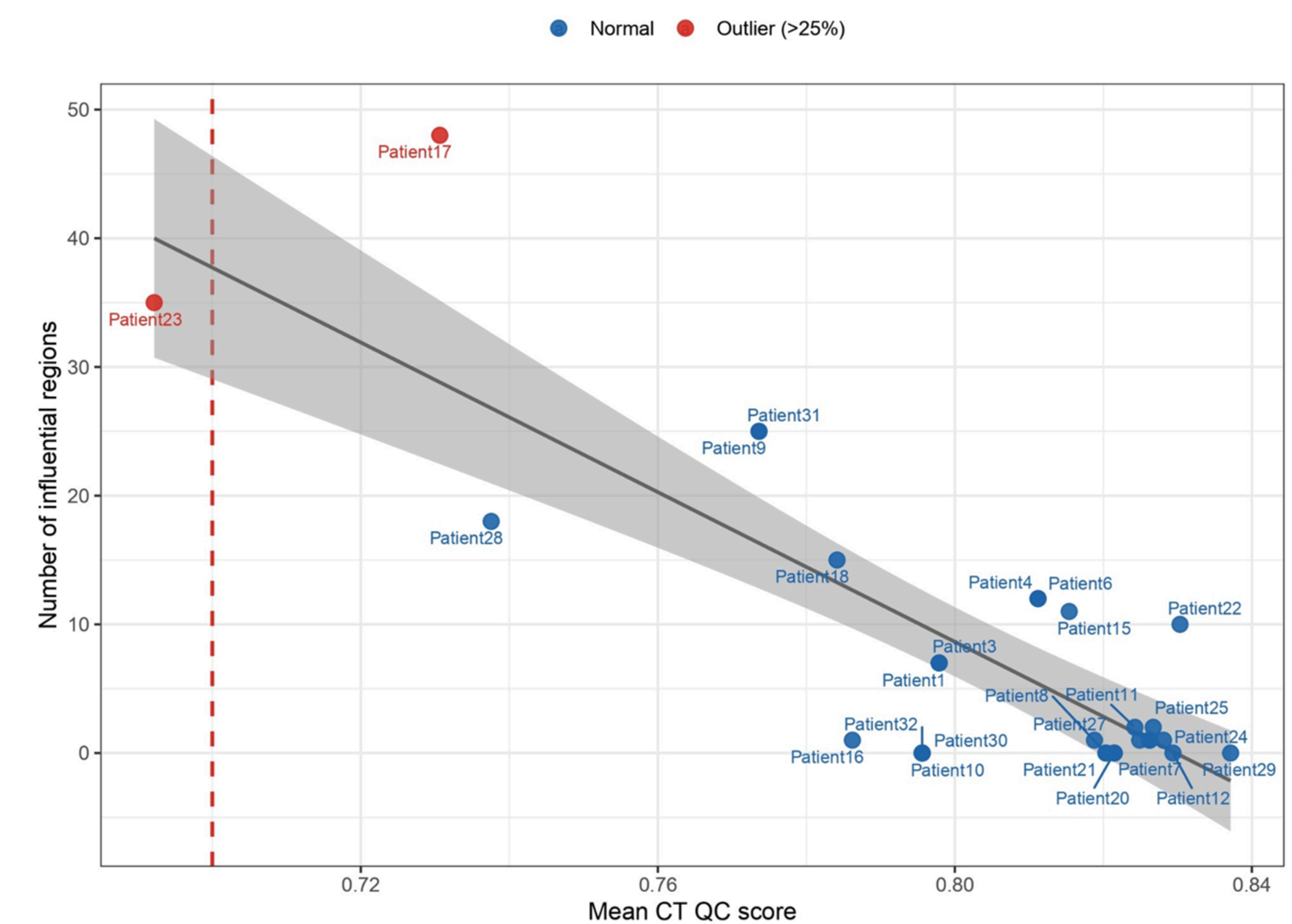


Figure 1. Relationship between mean CT segmentation quality (QC score) and the number of influential regions per patient (Cook's distance). Red points indicate global outliers (influential in >25% of regions). The dashed line represents the QC threshold, and the solid line shows the linear trend with 95% confidence interval.

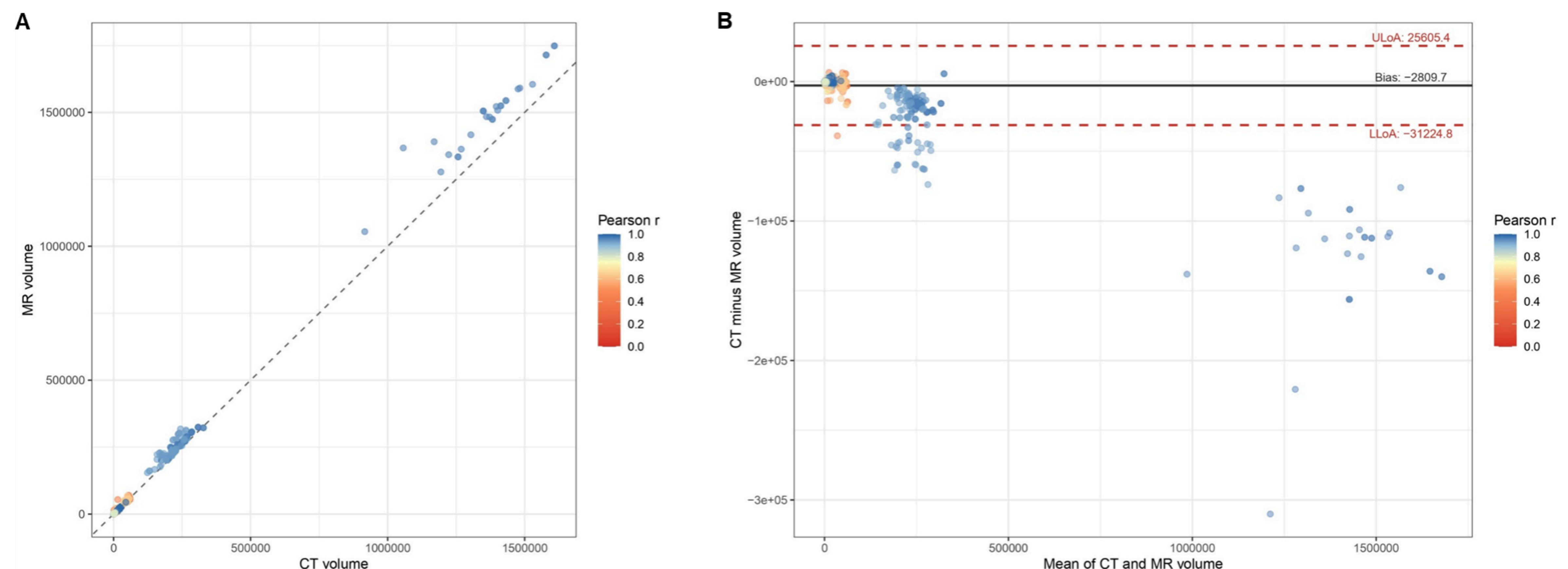


Figure 2. (A) Scatter plot showing the correlation between CT- and MRI-derived volumes across 101 brain regions and 31 subjects. The dashed line represents the identity line (CT = MRI). (B) Bland-Altman plot showing the difference in volumes (CT - MRI) against the mean volume ((CT + MRI)/2). The solid blue line represents the mean bias, and the dashed red lines represent the 95% limits of agreement (mean $\pm$ 1.96 standard deviation).

TAKE HOME-MESSAGE

Automated CT-based volumetry shows strong agreement with MRI and may enable scalable brain quantification in resource-limited settings.



SCAN ME

masima
precision medicine
for everyone
contato@masima.com.br