

Giovanna Correia Pereira Moro^{1,2,3}, Thaise Vallesca Queiroz^{1,2}, Joice Coutinho de Alvarenga^{2,3,4}, Gabriela Tomé Oliveira Engelmann^{2,3,4}, Pedro Vitor Araújo Valadares^{1,2}, Marcela Falleiros dos Reis^{1,2}, Jonas Jardim de Paula^{2,3,4,5,6}, Marco Aurélio Fagundes Angelo⁷, Anja Schneider⁸, Pamela Martino Adami⁹, Maria Carolina Dalmasso¹⁰, Luciana Costa Silva¹¹, Débora Marques de Miranda⁵, Marco Aurélio Romano-Silva^{5,6}, Luiz Armando Cunha de Marco⁵, Maria Aparecida Camargos Bicalho^{2,3,4,5,12}, Alfredo Ramírez Zuniga^{8,9}, Bernardo de Mattos Viana^{2,3,4,5,6}

1. Undergraduate Medicine, Federal University of Minas Gerais, Belo Horizonte, Minas Gerais, Brazil; 2. Cog-Aging Research Group, Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, Minas Gerais, Brazil; 3. Older Adult's Psychiatry and Psychology Extension Program (PROEPSI), School of Medicine, Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, Minas Gerais, Brazil; 4. Molecular Medicine Postgraduate Program, School of Medicine, Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, Minas Gerais, Brazil; 5. Neurotec R National Institute of Science and Technology (INCT-Neurotec R), Faculty of Medicine, Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, Minas Gerais, Brazil; 6. Department of Psychiatry, School of Medicine, Universidade Federal de Minas Gerais (UFMG), Belo Horizonte, Minas Gerais, Brazil; 7. Federal University of Minas Gerais, Belo Horizonte, Minas Gerais, Brazil; 8. German Center for Neurodegenerative Diseases (DZNE), Bonn, Germany; 9. Division of Neurogenetics and Molecular Psychiatry, Department of Psychiatry and Psychotherapy, Faculty of Medicine and University Hospital Cologne, University of Cologne, Cologne, Germany; 10. Studies in Neuroscience and Complex Systems Unit (ENyS-CONICET-HEC-UNAJ), Florencio Varela, Argentina; 11. Instituto Hermes Pardini (Grupo Fleury), Belo Horizonte, Brazil; 12. Department of Internal Medicine, School of Medicine, Federal University of Minas gerais, Belo Horizonte, Minas Gerais, Brazil

BACKGROUND

Blood-based biomarkers (BBM) provide high diagnostic accuracy for dementia. However, access remains limited in low- and middle-income countries. In contrast, visual atrophy scales (VAS) derived from magnetic resonance imaging (MRI) are more widely accessible and continue to be used to improve diagnostic accuracy.

Objective: To evaluate the ability of BBM to predict abnormal VAS scores.

METHODS

COHORT · n = 28
Cog-Aging cohort · 2019–2024
Clinical, neuropsychological & neuroimaging work-up → diagnosis



STATISTICAL ANALYSIS

1 Mann-Whitney U
each biomarker: normal vs abnormal, every scale

2 Logistic regression
adjusted for age & creatinine clearance

Figure produced with AI assistance (Claude, Anthropic) from the authors' own data; verified by the authors.

CONTACT INFORMATION

Giovanna Correia Pereira Moro
Email: giovannamoro@ufmg.br

Bernardo de Mattos Viana, MD, Ph.D
Email: bernardomviana@yahoo.com

pTau-217 and GFAP are the most robust blood-based biomarkers for predicting abnormal ERICA scores

RESULTS

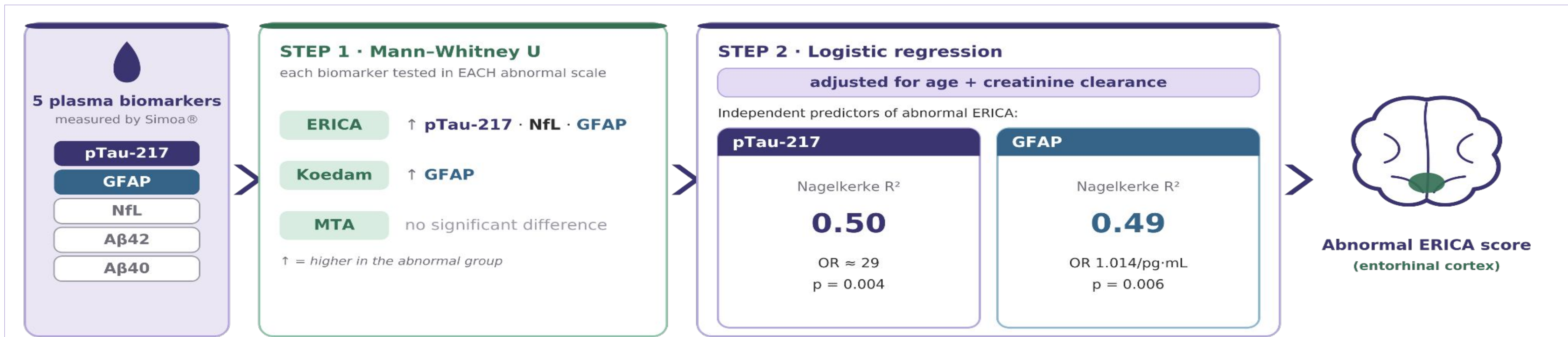


Figure produced with AI assistance (Claude, Anthropic) from the authors' own data; verified by the authors.

Figure - Significant Mann-Whitney U

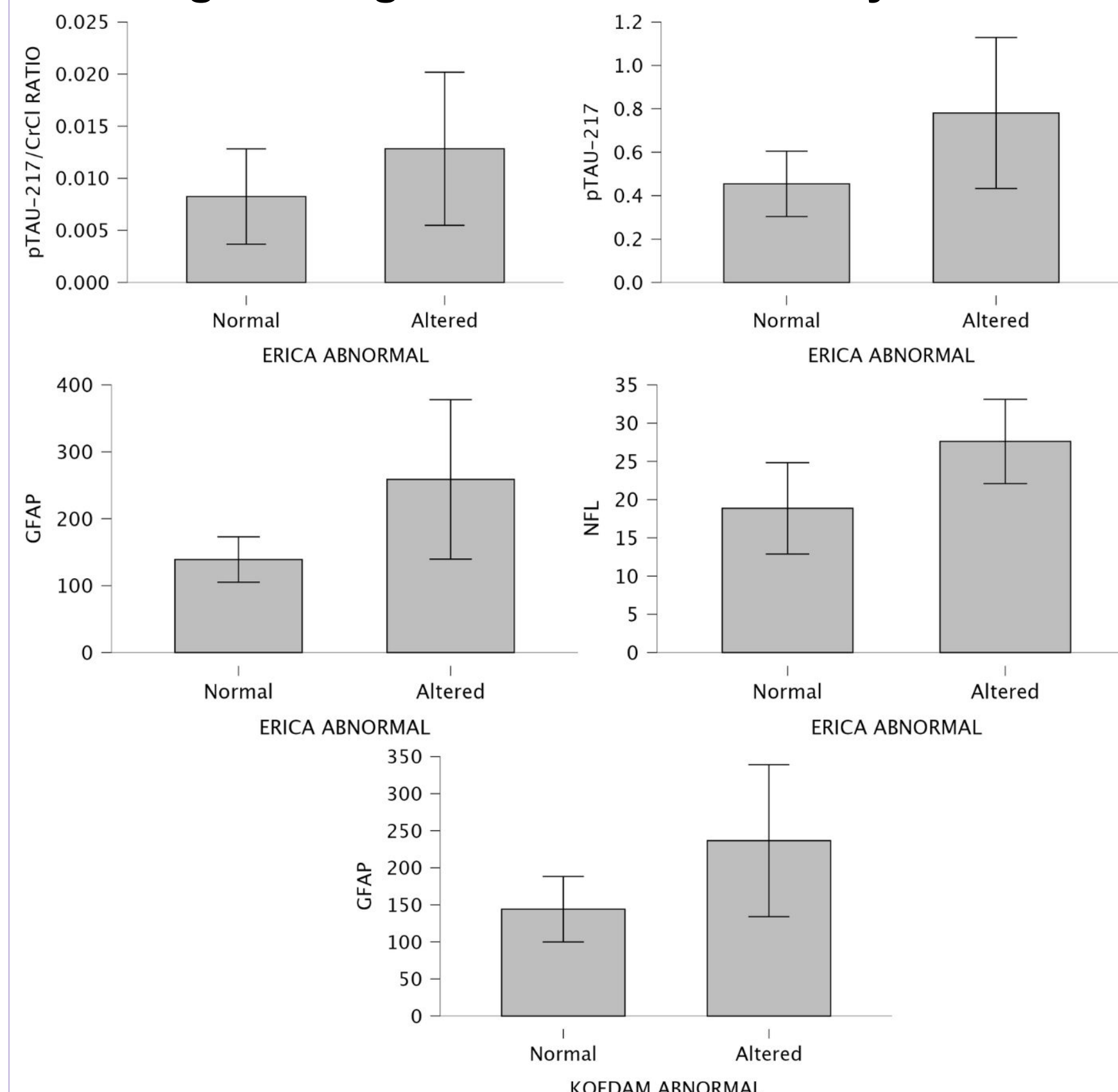


Table - Significant Logistic Regression Models

Model Summary										
Model	Deviance	AIC	BIC	df	ΔX²	p	McFadden R²	Nagelkerke R²	Tjur R²	Cox & Snell R²
M₀ - Control for ERICA Scale Abnormal for pTau-217	38.24	40.243	41.575	27			0		0	
M₁ - ERICA Scale Abnormal for pTau-217	25.09	33.094	38.423	24	13.149	0.004	0.344	0.503	0.375	0.375
M₀ - Control for ERICA Scale Abnormal for GFAP	38.24	40.243	41.575	27			0		0	
M₁ - ERICA Scale Abnormal for GFAP	25.68	33.684	39.013	24	12.558	0.006	0.328	0.485	0.373	0.361

Coefficients									
Model		Estimate	Standard Error	Standardized*	Odds Ratio	z	Wald Statistic	df	p
M₀ - Control for ERICA Scale Abnormal for pTau-217 M₁ - ERICA Scale Abnormal for pTau-217	(Intercept)	-0.288	0.382	-0.288	0.75	-0.753	0.568	1	0.451
	(Intercept)	-23.022	10.163	-0.432	1.004×10-10	-2.265	5.132	1	0.023
	Age	0.235	0.104	1.993	1.264	2.258	5.096	1	0.024
	CrCl	0.042	0.033	0.767	1.043	1.259	1.586	1	0.208
	pTau-217	3.366	1.649	1.481	28.966	2.042	4.168	1	0.041
M₀ - Control for ERICA Scale Abnormal for GFAP M₁ - ERICA Scale Abnormal for GFAP	(Intercept)	-0.288	0.382	-0.288	0.75	-0.753	0.568	1	0.451
	(Intercept)	-18.44	8.737	-0.126	9.805×10-9	-2.111	4.455	1	0.035
	Age	0.17	0.086	1.447	1.186	1.99	3.961	1	0.047
	CrCl	0.04	0.035	0.739	1.041	1.168	1.364	1	0.243
	GFAP	0.014	0.007	2.013	1.014	1.997	3.988	1	0.046

CONCLUSIONS

These findings suggest that pTau-217 and GFAP are the most robust BBM for predicting abnormal ERICA scores, and pTau-217 stood out as the best model, highlighting a potential interface between pTau-217 and MRI-derived measures of early medial temporal neurodegeneration. These are preliminary results and further studies with a larger sample are necessary.

REFERENCES

- Scheltens P, Leys D, Barkhof F, Huglo D, Weinstein HC, Vermersch P, et al. Atrophy of medial temporal lobes on MRI in "probable" Alzheimer's disease and normal ageing: diagnostic value and neuropsychological correlates. J Neurol Neurosurg Psychiatry. 1992;55(10):967-72. doi:10.1136/jnnp.55.10.967.
- Enkirch SJ, Traschütz A, Müller A, Widmann CN, Gielen GH, Heneka MT, et al. The ERICA score: an MR imaging-based visual scoring system for the assessment of entorhinal cortex atrophy in Alzheimer disease. Radiology. 2018;288(1):226-35. doi:10.1148/radiol.2018171888.
- Koedam ELGE, Lehmann M, van der Flier WM, et al. Visual assessment of posterior atrophy: development of a MRI rating scale. Eur Radiol. 2011;21(12):2618-25. doi:10.1007/s00330-011-2205-4.
- Jack CR Jr, Andrews JS, Beach TG, Buracchio T, Dunn B, Graf A, et al. Revised criteria for diagnosis and staging of Alzheimer's disease: Alzheimer's Association Workgroup. Alzheimers Dement. 2024;20(8):5143-69. doi:10.1002/alz.13859.
- Teunissen CE, Verberk IMW, Thijssen EH, Vermunt L, Hansson O, Zetterberg H, et al. Blood-based biomarkers for Alzheimer's disease: towards clinical implementation. Lancet Neurol. 2022;21(1):66-77. doi:10.1016/S1474-4422(21)00361-6.
- Palmqvist S, Janelidze S, Quiroz YT, Zetterberg H, Lopera F, Stomrud E, et al. Discriminative accuracy of plasma phospho-tau217 for Alzheimer disease vs other neurodegenerative disorders. JAMA. 2020;324(8):772-81. doi:10.1001/jama.2020.12134.