

Advancing Ataxia Research in Northeast Brazil

Scientific Trajectory, Clinical Cohorts, and Translational Research at the Federal University of Ceará

Prof. Pedro Braga Neto | Neurologist & Associate Professor
Ataxia Outpatient Clinic - Walter Cantídio University Hospital

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Navigating Our Journey

The Challenge of Ataxia

Scientific Trajectory & Innovations

Building the UFC Ataxia Unit

Cohort Demographics & The Consanguinity Effect

Current Research Horizons

Open Discussion

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Addressing a Complex Clinical Puzzle

High Complexity
Heterogeneous and historically underdiagnosed neurodegenerative disorders requiring specialized clinical expertise.

Systemic Constraints
Extremely limited access to advanced diagnostic tools and genetic testing in low-resource and emerging healthcare settings.

Translational Opportunity
A critical opening to conduct impactful, ground-breaking translational research that directly improves patient outcomes in underserved demographics.

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Pioneering a New Paradigm in Machado-Joseph Disease

Paradigm Shift Matrix

Historical Context	The Innovation
<ul style="list-style-type: none"> Ataxia research was predominantly restricted to motor symptoms. Non-motor manifestations were largely underrecognized and underestimated. 	<ul style="list-style-type: none"> Spearheaded research into the non-motor aspects of Machado-Joseph Disease during PhD at UNIFESP (2011). Illuminated the Cerebellar Cognitive Affective Syndrome (CCAS) in MJD. Highlighted the critical clinical relevance of olfactory impairment. Integrated clinical findings with functional and molecular neuroimaging biomarkers.

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Mapping the Non-Motor Neural Pathways

Prefrontal Cortex

Olfactory Bulb

Cerebellar Cognitive Affective Syndrome in Machado-Joseph Disease: Core Clinical Features

Clinical correlates of olfactory dysfunction in spinocerebellar ataxia type 3*

Cerebellar damage disrupts critical neural networks beyond mere motor control, resulting in distinct cognitive, affective, and olfactory deficits previously unmapped in Spinocerebellar Ataxia Type 3.

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Expanding the Phenotype of Machado-Joseph Disease

Historical Paradigm	The Expanded Spectrum
<ul style="list-style-type: none"> Predominantly recognized as a pure motor disorder. Non-motor manifestations broadly underrecognized or dismissed as secondary. 	<ul style="list-style-type: none"> Cognitive Dysfunction: Identification of the Cerebellar Cognitive Affective Syndrome (CCAS) as a core feature. Olfactory Impairment: Documenting distinct sensory deficits. Integration: Correlating these non-motor aspects directly with functional and molecular neuroimaging.

Based on PhD research at Federal University of São Paulo (2011), supervised by Orlando G. P. Barzolini.

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Building the Foundation: The UNIFESP Years

Ataxias in Brazil: 17 years of experience in an ataxia center
Ataxias no Brasil: 17 anos de experiência em um centro de ataxias

Demographics	N (%)
Total cases	1,332 (100.00)
Spinocerebellar ataxias	326 (24.47)
Autosomal recessive cerebellar ataxias	186 (13.94)

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The Return to Fortaleza: Building an Ataxia Program

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The Demographic Variable in Northeast Brazil

Baseline
Historically high rates of endogamy and consanguinity in regional subpopulations.

Genetic Consequence
Increased mathematical probability of recessive allele pairing.

Clinical Outcome
A disproportionately high prevalence of Autosomal Recessive (AR) ataxias compared to national baselines.

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A Collaborative Hub for Excellence

Postgraduate Researchers: Stephanie Scott, Edvan Camelo Filho, Deborah Moreira Rangel

Undergraduate Researchers: Rodrigo Fagundes da Rosa, Oliver Miyajima

Clinical Partnerships: Direct collaboration with Hospital Geral de Fortaleza (Dr. Deborah Moreira Rangel, Dr. Paula Camila Rangel).

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The Regional Anomaly: High Prevalence of Recessive Ataxias

Total: 48 cases

Autosomal Recessive (AR): 64.6% (31 cases)
(29 AR + 4 CANVAS)

Autosomal Dominant (AD): 31.3% (15 cases)

Insight Note: The distribution pattern in the UFC Ataxia Unit reveals a striking departure from typical global inheritance distributions, demanding specialized clinical and epidemiological focus.

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Profiling the Autosomal Recessive Cohort

The **64.6%** Breakdown (including CANVAS):

Insight Note: Including the 4 CANVAS cases, recessive ataxias account for **64.6%** of the total cohort.


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Current Translational Research Lines




Clinical Scale Adaptation

Validating international diagnostic tools for the Brazilian population.



Biomarkers & Epidemiology

Leveraging the unique regional demographics to study recessive ataxias.



Phenotypic Expansion

Investigating rare metabolic causes and associated systemic symptoms.

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Validating Global Metrics for Regional Reality

From Cross-Cultural Adaptation to Translational Impact


ESTABLISHED FOUNDATIONS (PUBLISHED - UFC ATAXIA UNIT)	ONGOING RESEARCH & STRATEGIC EXPANSION	IMPACT
<ul style="list-style-type: none"> Sleep disorders in Niemann-Pick disease Type C beyond category First characterization of sleep disturbances in NPC type C Published in <i>Sleep Medicine</i> (2025) 	<ul style="list-style-type: none"> PROM-Ataxia - Psychometric Validation (ongoing) Reliability Responsiveness Clinical trial applicability 	<ul style="list-style-type: none"> Global Clinical Trials Enabling Brazilian cohorts to participate in international multi-center studies
<ul style="list-style-type: none"> CCAS / Schmahmann Syndrome Scale Cross-cultural adaptation and validation Published in <i>The Cerebellum</i> (2023) 	<ul style="list-style-type: none"> Peripheral Nerve Ultrasound as a Biomarker Structural assessment in hereditary ataxias Potential diagnostic/prognostic value 	<ul style="list-style-type: none"> Precision Medicine Better characterization, stratification and personalized care for ataxia patients
<ul style="list-style-type: none"> PROM-Ataxia - Brazilian version Cross-cultural adaptation completed Published in <i>The Cerebellum</i> (2023) 	<ul style="list-style-type: none"> Nerve Ultrasound Detects Peripheral Nerve Enlargement in Cerebrotendinous Xanthomatosis Published in <i>Neuro & Biomechanics</i> (2024) 	<ul style="list-style-type: none"> Regional Leadership SFC Ataxia Unit as a reference center for research, training and innovation in ataxias
<ul style="list-style-type: none"> Seven Neurofilament Light Levels in Patients with Cerebrotendinous Xanthomatosis - Pilot Study Published in <i>The Cerebellum</i> (2025) 	<ul style="list-style-type: none"> Epidemiology of Recessive Ataxias (Northeast Brazil) Unique genetic landscape High prevalence of recessive forms 	<ul style="list-style-type: none"> Translational Impact From local reality to global relevance in neurology and rare diseases
<ul style="list-style-type: none"> Expanding clinical characterization and deep phenotyping in rare ataxias and related disorders 	<ul style="list-style-type: none"> Generating evidence to understand, measure and impact ataxias in Brazil 	<ul style="list-style-type: none"> Advancing ataxia research and care from Northeast Brazil to the world

An integrated platform combining clinical scales, patient-reported outcomes, imaging biomarkers and epidemiological data. → Positioning Brazilian cohorts for global trials and precision medicine.

Engel CM, Soares-Nes MA, Rodrigues CK, et al. Sleep disorders in Niemann-Pick disease type C beyond category. *Sleep Medicine* 2025. |
 Sosa SSO, Pottner J, Slav V, et al. CCAS: Cross-Cultural Adaptation and Validation to Evaluate the Impact of the Cerebellar Cognitive Ataxia/ Schmahmann Syndrome Scale. *The Cerebellum* 2023. |
 Sosa SSO, Martins AC, Furtado DV, et al. Cross-Cultural Adaptation of the Patient-Reported Outcome Measure of Ataxia: The Brazilian Version of PROM-Ataxia. *The Cerebellum* 2023. |
 Cavaleiro FHO, Lima PUGB, Soares TBS, et al. Nerve Ultrasound Detects Peripheral Nerve Enlargement in Cerebrotendinous Xanthomatosis. *Neuro & Biomechanics* 2024. |
 Cavaleiro FHO, Lima PUGB, Soares TBS, et al. Seven Neurofilament Light Levels in Patients with Cerebrotendinous Xanthomatosis: A Pilot Study. *The Cerebellum* 2025.


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Biomarkers and Demographics



Focus Area 1: Neurofilaments in Recessive Ataxias

Investigating structural neuronal proteins as reliable, easily accessible blood-based biomarkers to track disease progression and therapeutic response.



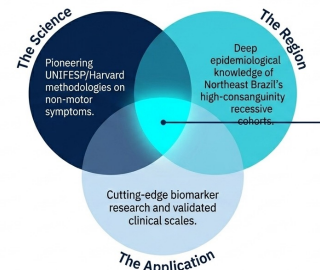
Focus Area 2: Epidemiology

Executing dedicated epidemiological mapping of Friedreich's Ataxia (FRDA) and other recessive ataxias specifically within the high-consanguinity populations of Northeast Brazil.

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The Bridge to Impact



UFC Ataxia Unit

The UFC Ataxia Unit is not merely treating an underserved population; it has transformed a geographic challenge into a globally significant engine for translational ataxia research.

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