



Nuevas tecnologías en neurorrehabilitación

Alba Jiménez Cubo, PT, MsC
Coordinadora formación grupo Mbody



Nuevas tecnologías



Puntos en común

Fatiga

Debilidad

Alteraciones
de la marcha

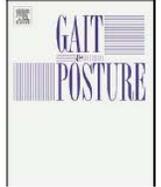
Cardiopatías

Afectación
PPCC
• VII, X, XII

Disartria

Disfagia

Biomecánica



Full length article

A systematic review of the gait characteristics associated with Cerebellar Ataxia

Ellen Buckley^a, Claudia Mazzà^{b,c}, Alisdair McNeill^{a,c,d,*}

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^d Sheffield Children's Hospital, UK



THE RELIABILITY OF GAIT PARAMETERS CAPTURED VIA INSTRUMENTED WALKWAYS: A SYSTEMATIC REVIEW AND META-ANALYSIS

Monica PARATI, Emilia AMBROSINI, Beatrice DE MARIA, Matteo GALLOTTA, Laura Adelaide DALLA VECCHIA, Giorgio FERRIERO, SIMONA FERRANTE

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Biomecánica

Gait & Posture 60 (2018) 154–163

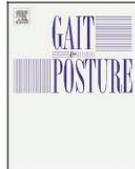
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Gait & Posture

journal homepage: www.elsevier.com/locate/gaitpost



ELSEVIER



Full length article

A systematic review of the gait characteristics associated with Cerebellar Ataxia

Ellen Buckley^a, Claudia Mazzà^{b,c}, Alisdair McNeill^{a,c,d,*}

^a Department of Neuroscience, University of Sheffield, UK

^b Department of Mechanical Engineering, University of Sheffield, UK

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^d Sheffield Children's Hospital, UK



Right loading response

Right midstance

Right terminal stance

Right preswing

Stance phase

Right initial swing

Activaciones musculares

Swing phase

Velocidad de la marcha

Amplitud de movimiento y parámetros cinemáticos

Coste energético

Longitud del paso

Right toe off

Right and left foot aligned

Right tibia vertical

Right initial contact

El ser humano está diseñado para moverse



Adaptado de: Booth, F. W., Roberts, C. K., Thyfault, J. P., Rueggsegger, G. N. & Toedebusch, R. G. Role of inactivity in chronic diseases: evolutionary insight and pathophysiological mechanisms. *Physiol. Rev.* 97, 1351–1402 (2017).

Cerebellar Ataxia

Susan L. Perlman, MD

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Current Treatment Options in Neurology 2000, 2:215-224

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Marcha segura

Independencia en AVD

Mejora del habla y deglución

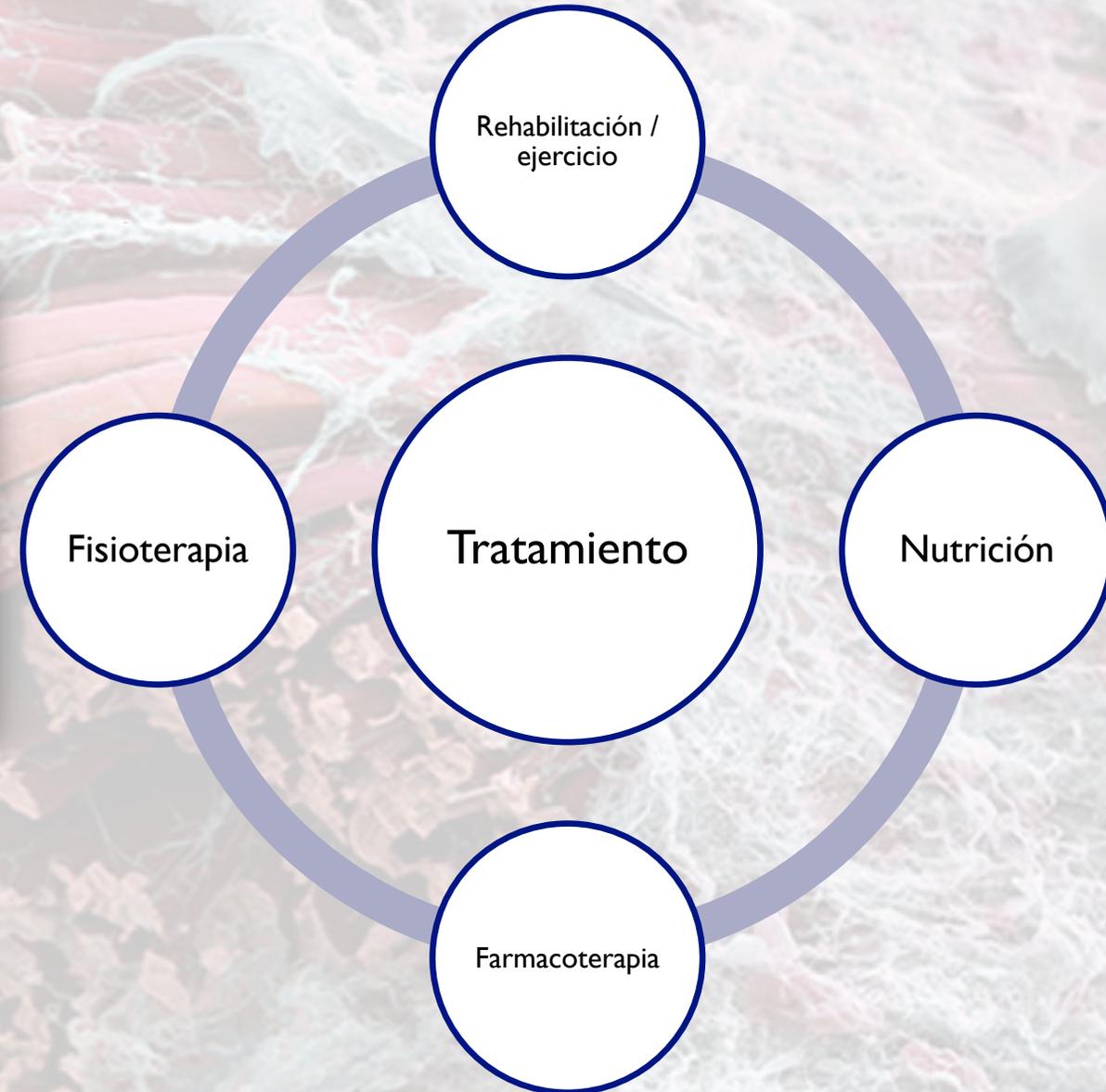
Mantenimiento de la capacidad
cardiorespiratoria

Prevención cambios derivados por inmovilidad

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**Atrophy, oxidative switching and ultrastructural defects in skeletal muscle of Ataxia
Telangiectasia mouse model.**

Valentina Tassinari^{1,2#}, Vincenzo De Gennaro^{1,3#}, Gina La Sala⁴, Daniela Marazziti⁴, Giulia Bolasco⁵, Salvatore Aguanno¹, Luciana De Angelis¹, Fabio Naro¹ and Manuela Pellegrini^{1,4*}



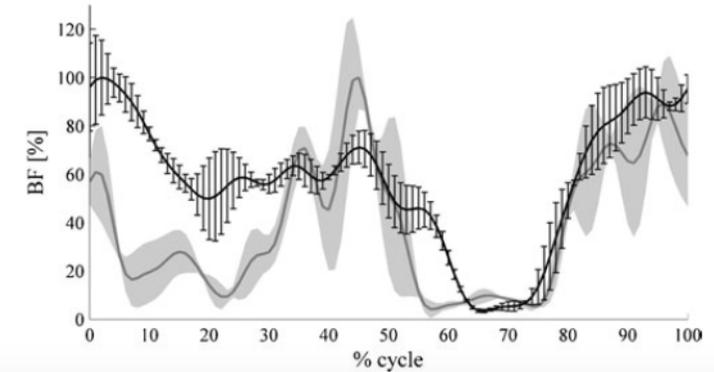
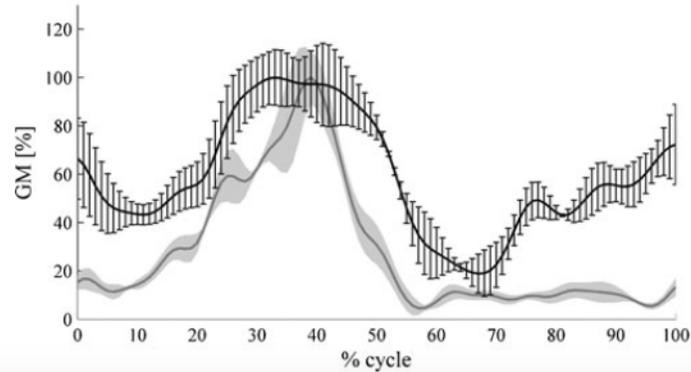
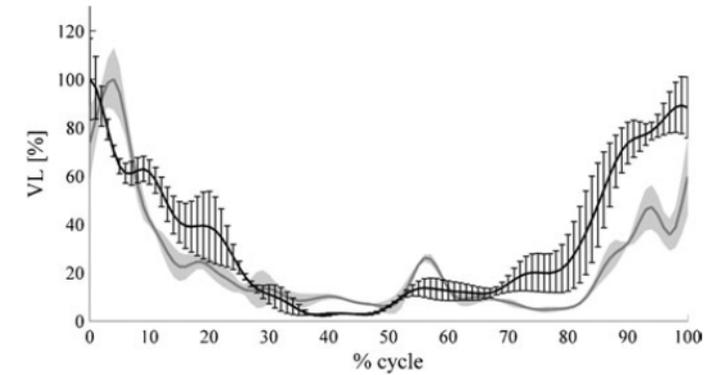
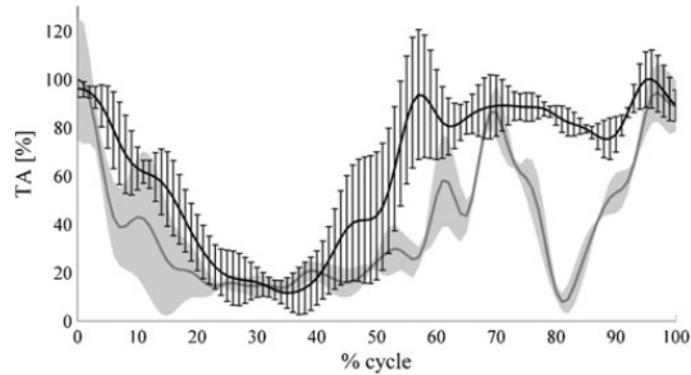
Lower Limb Antagonist Muscle Co-Activation and its Relationship with Gait Parameters in Cerebellar Ataxia

Silvia Mari · Mariano Serrao · Carlo Casali · Carmela Conte · Giovanni Martino ·
Alberto Ranavolo · Gianluca Coppola · Francesco Draicchio · Luca Padua ·
Giorgio Sandrini · Francesco Pierelli

Co-contracción como estrategia para reducir falta de estabilidad

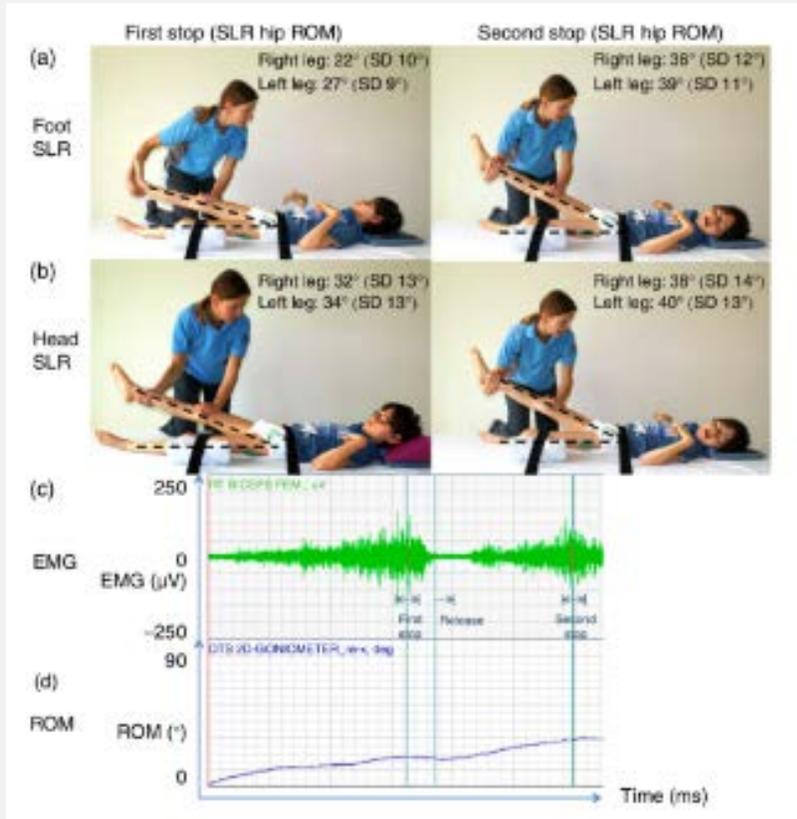
Relacionado con la severidad de la lesión

Alteración de contracción antagonista, provoca un aumento del coste metabólico



Nervio periférico: parálisis cerebral

2016

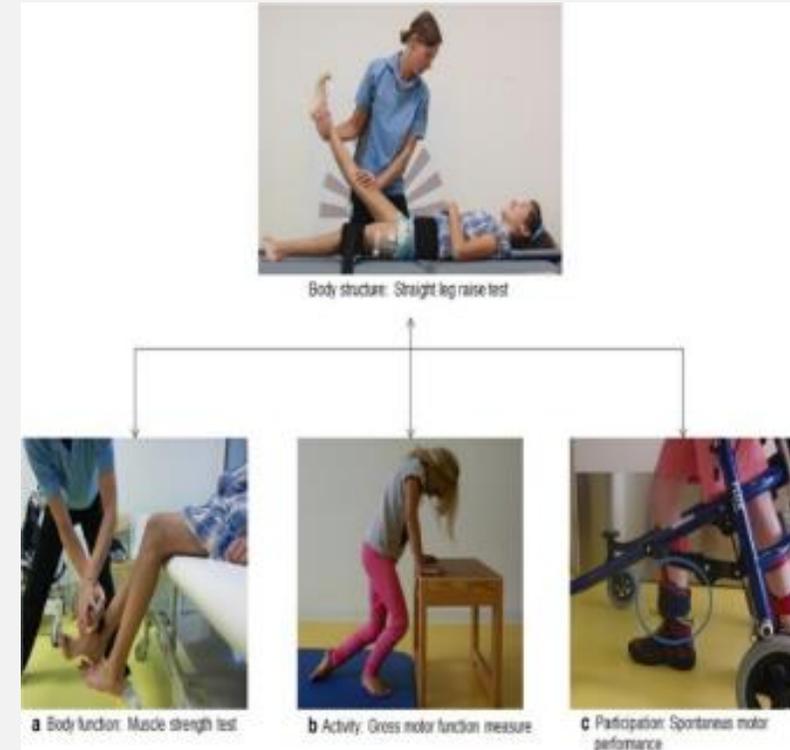


Reliability and practicability of the straight leg raise test in children with cerebral palsy

PETRA MARSICO¹ | AMIR TAL-AKABI² | HUBERTUS J A VAN HEDEL¹

¹ Paediatric Rehab Research Group, Rehabilitation Centre for Children and Adolescents, University Children's Hospital Zurich, Affoltern am Albis; ² Department of Health, Bern University of Applied Sciences, Bern, Switzerland.

Correspondence to Petra Marsico at Rehabilitation Centre for Children and Adolescents, University Children's Hospital Zurich, Mühlbergstrasse 104, CH-8050 Affoltern am Albis, Switzerland. E-mail: petra.marsico@kjp.uzh.ch



Communication

Ankle and Foot Spasticity Patterns in Chronic Stroke Survivors with Abnormal Gait

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Dorsiflexion

Invertors

- Tibialis anterior

Evertors

- EHL
- EDL
- Peroneus tertius

Plantarflexion

Invertors

- Soleus
- Tibialis posterior
- FHL
- FDL

Evertors

- Gastroc
- Peroneal longus
- Peroneal brevis



Inversion

Dorsiflexors

- Tibialis Anterior
- EHL

Plantar flexors

- Tibialis posterior
- FHL
- FDL
- Soleus

Eversion

Dorsiflexors

- EDL
- Peroneal tertius

Plantarflexors

- Peroneal longus
- Peroneal brevis
- Gastrocnemius





Spinocerebellar ataxia: an update

Roisin Sullivan¹ · Wai Yan Yau¹ · Emer O'Connor¹ · Henry Houlden¹

Received: 27 July 2018 / Revised: 21 September 2018 / Accepted: 25 September 2018
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The Intersection Between Cerebellar Ataxia and Neuropathy: a Proposed Classification and a Diagnostic Approach

Cristina Saade Jaques¹ · Marcio Luiz Escorcio-Bezerra¹ · José Luiz Pedroso¹ · Orlando Graziani Povoas Barsottini¹

Accepted: 2 May 2021
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Associated clinical features

Genetic subtypes

Peripheral neuropathy	1, 2, 3, 4, 18, 25, 38, 43, 46
Pyramidal signs	1, 3, 7, 8, 10, 14, 15, 17, 35, 40, 43
Dystonia	3, 14, 17, 20, 35
Myoclonus	14
Parkinsonism	2, 3, 10, 14, 17, 19/22, 21
Tremor	12, 15, 27
Chorea	17, 27, DRPLA
Cognitive impairment	2, 8, 13, 17, 19/22, 21, 36, 44, DRPLA
Psychiatric symptoms	2, 17
Ophthalmoplegia	2, 3, 28, 40
Visual impairment	7
Face/tongue fasciculation	36
Ichthyosiform plaques	34
Seizures	10, 19/22, ATN1
Narcolepsy	DNMT1
Hearing loss	31, 36, DNMT1

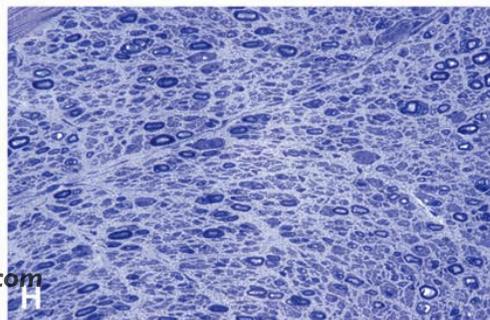
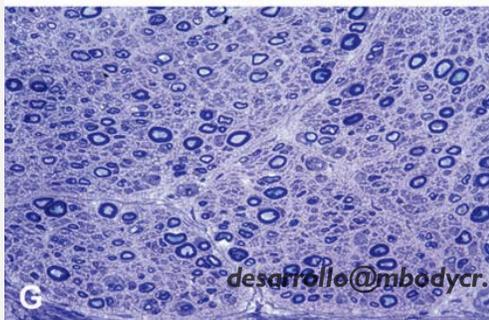
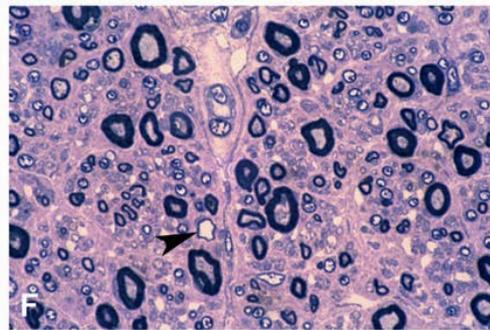
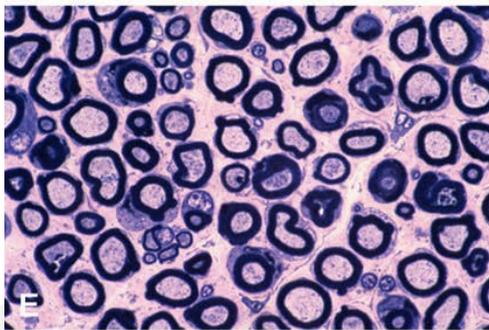
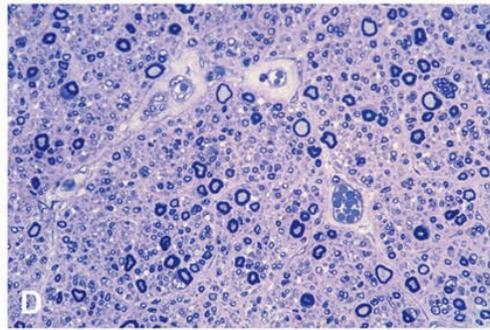
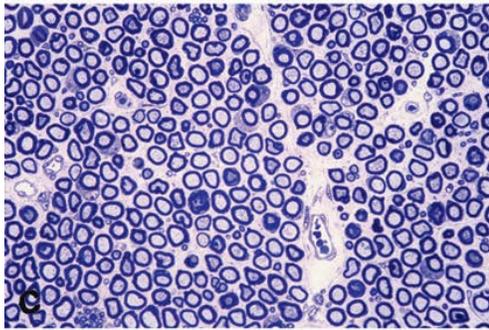
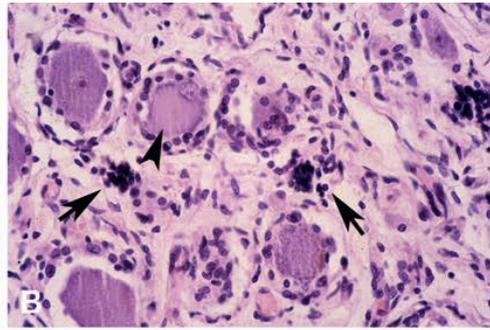
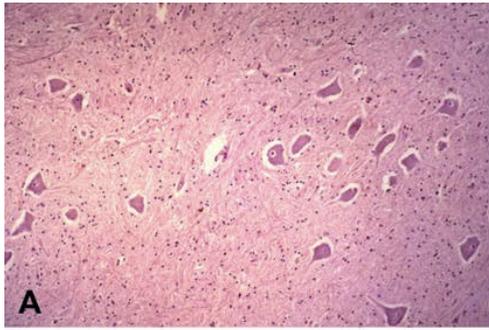
ATN1 atrophin 1, mutation responsible for dentatorubral–pallidoluy-sian atrophy, *DNA methyltransferase 1*, mutation responsible for ADCA-deafness and narcolepsy

Chapter 51

Peripheral nerve involvement in hereditary cerebellar and multisystem degenerative disorders

JOSÉ BERCIANO*, ANTONIO GARCÍA, AND JON INFANTE

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University of Cantabria and Centro de Investigación Biomédica en Red de Enfermedades Neurodegenerativas,
Santander, Spain



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Pattern of Peripheral Nerve Involvement in Spinocerebellar Ataxia Type 2: a Neurophysiological Assessment

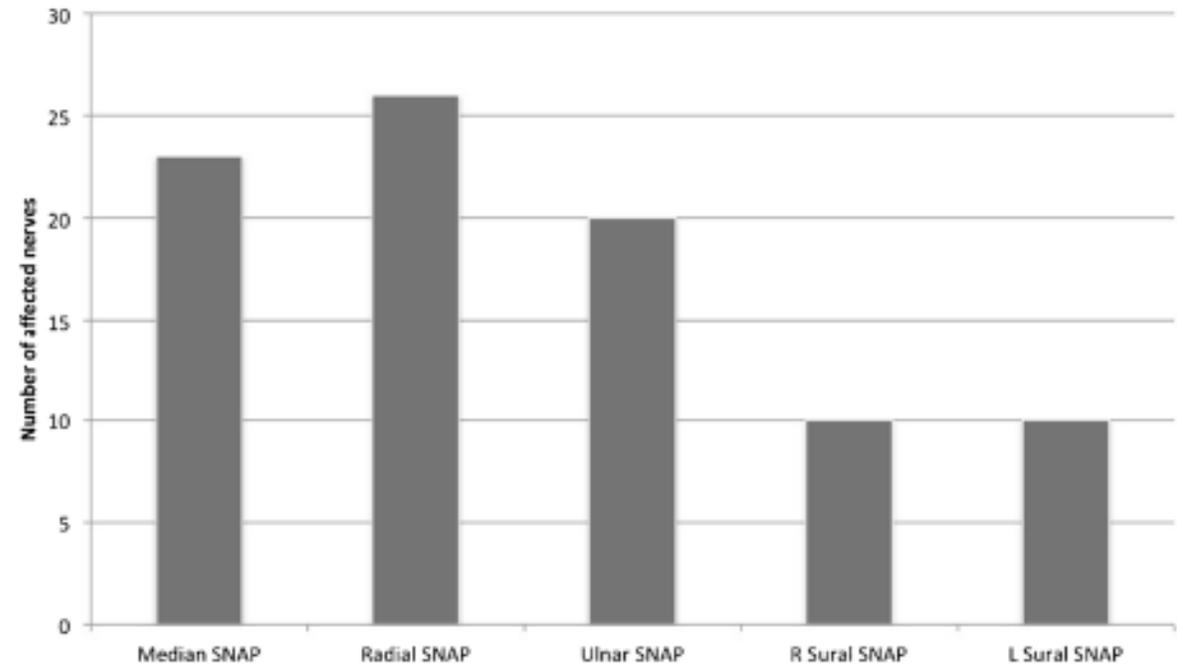
Marcio Luiz Escorcio Bezerra¹ · José Luiz Pedrosa¹ · Pedro Braga-Neto^{1,2} · Agessandro Abrahao¹ · Marcus Vinicius Cristino de Albuquerque¹ · Franklin Roberto Pereira Borges Jr^{3,4} · Maria Luiza Saraiva-Pereira⁵ · Laura Bannach Jardim⁶ · Nadia Iandoli de Oliveira Braga¹ · Gilberto Mastrocola Manzano¹ · Orlando G. P. Barsottini¹

>80%
personas con
ataxia tienen
neuropatías
por
atrapamiento

Mayor
afectación de
fibras
sensoriales
que motoras

Es necesaria
una
evaluación
más
exhaustiva de
fibras y
conducción
neural

Number of sensory nerves with reduced amplitudes among the 26 SCA2 patients with peripheral neuropathy



Limb immobilization alters functional electrophysiological parameters of sciatic nerve

J.S.M. Alves¹, J.H. Leal-Cardoso¹, F.F.U. Santos-Júnior¹, P.S. Carlos¹, R.C. Silva³, C.M. Lucci³, S.N. Bão³, V.M. Ceccatto¹ and R. Barbosa²

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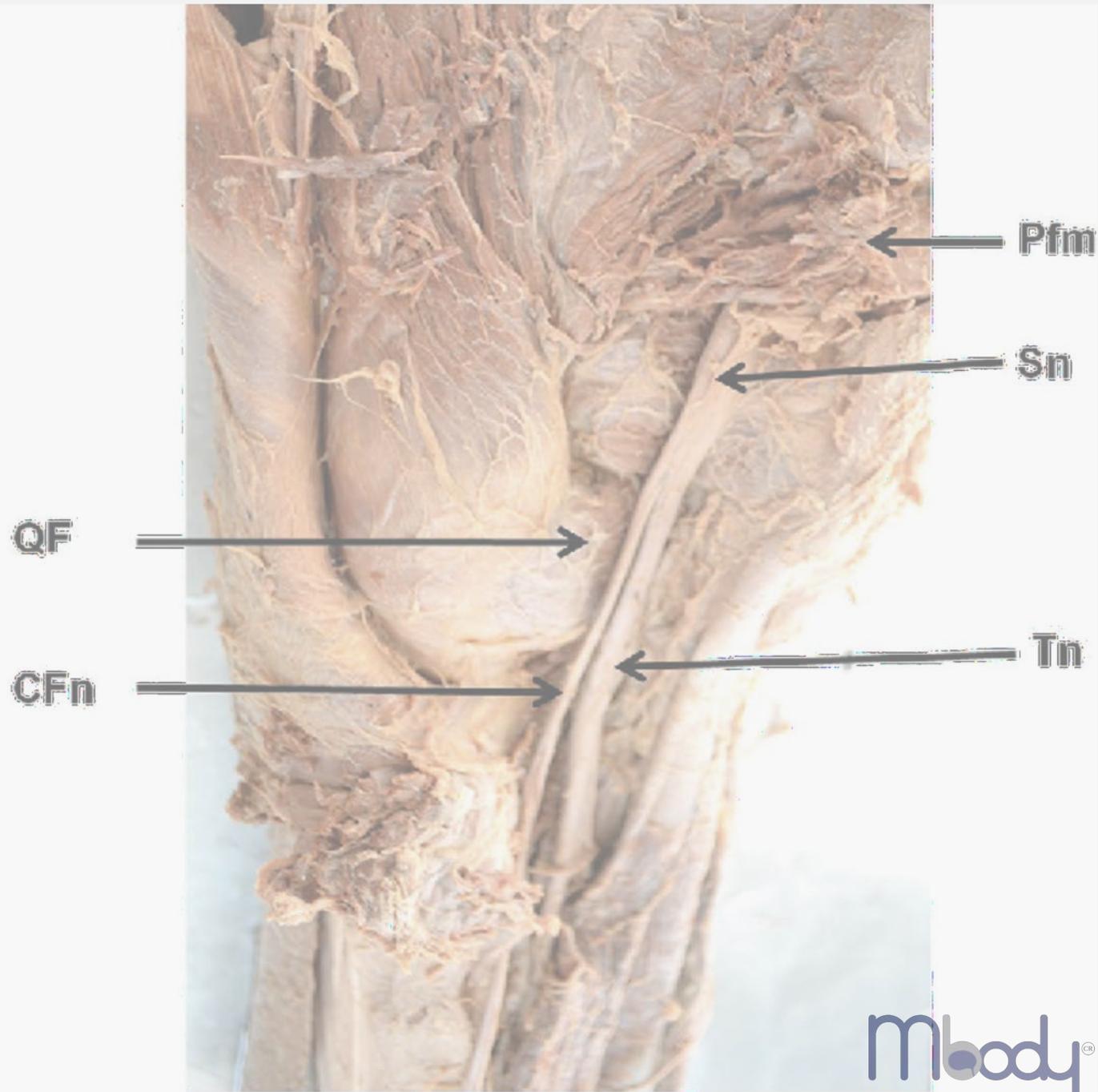
³Instituto de Ciências Biológicas, Universidade de Brasília, Brasília, DF, Brasil

2 semanas de inmovilización y grupo de control

Hiperexcitabilidad nerviosa de la musculatura implicada

Deterioro de la mielina y degeneración axonal

No solamente está afectada la musculatura, también hay una privación neural de origen desconocido.





Masterclass

Reappraising entrapment neuropathies – Mechanisms, diagnosis and management[☆]

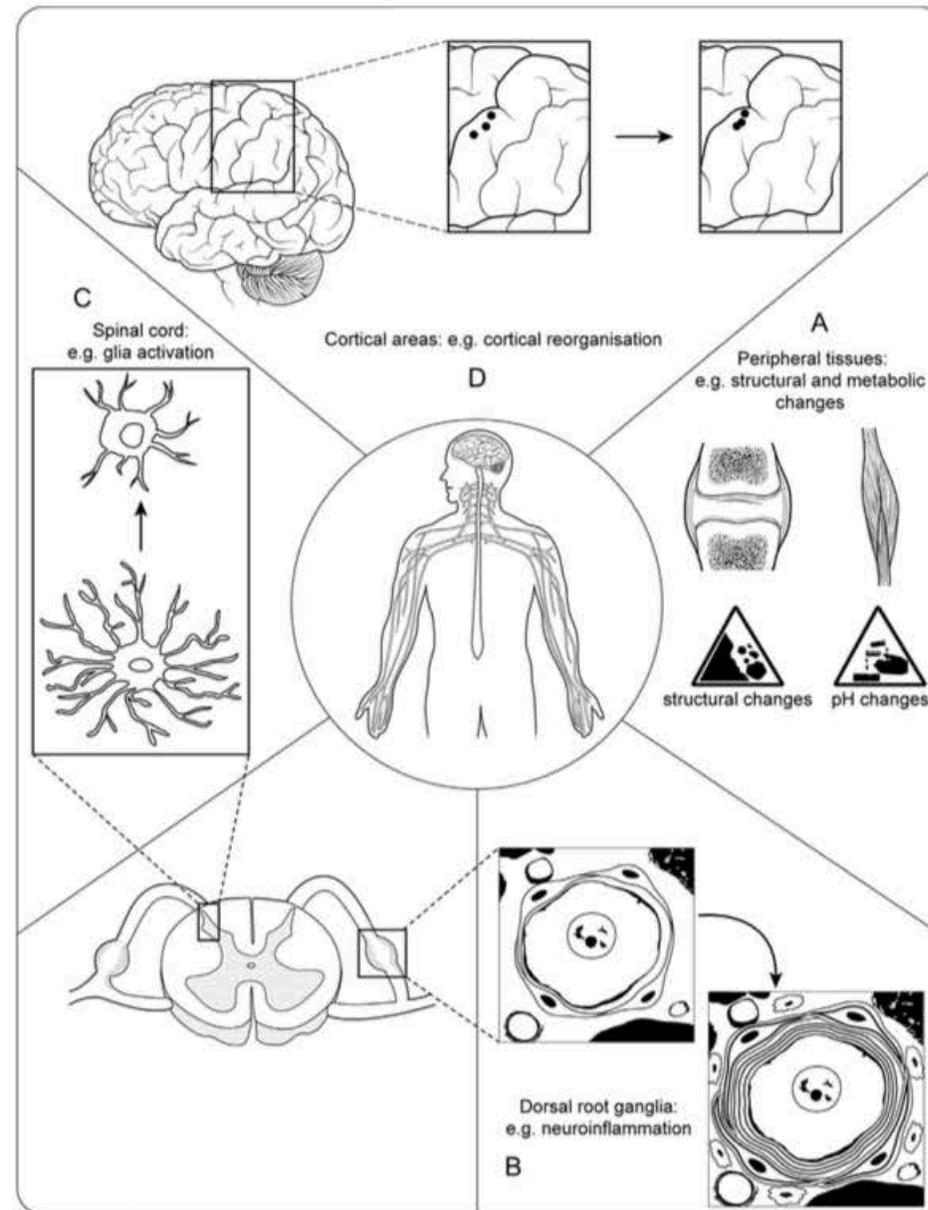
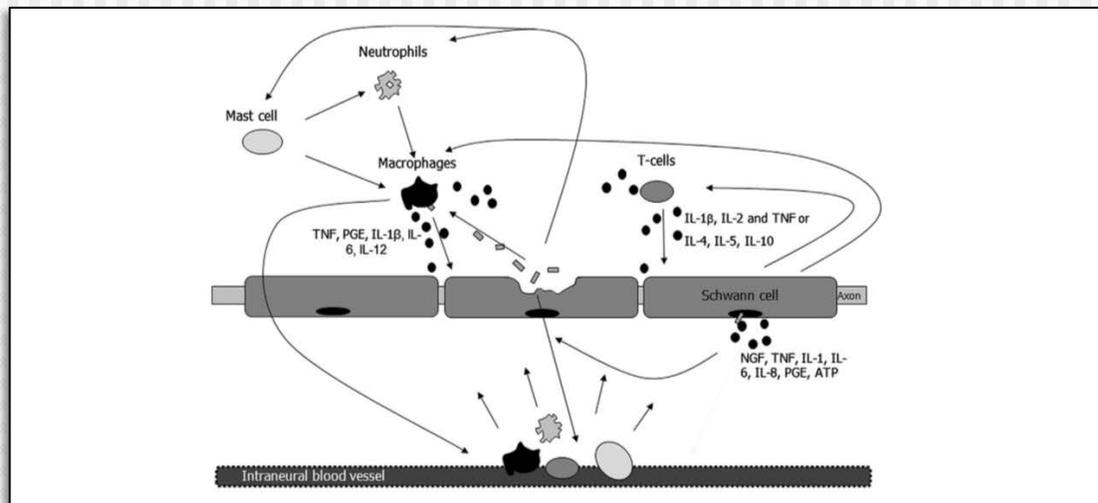
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^bUniversity of Oxford, Nuffield Department of Clinical Neurosciences, Oxford, United Kingdom

^cPacific University, School of Physical Therapy, Hillsboro, OR, USA

^dFaculty of Human Movement Sciences, MOVE Research Institute Amsterdam, VU University Amsterdam, Amsterdam, The Netherlands



Neuropatías

Genética
Neurofisiología
Integridad tisular
Biomecánica

Emociones
Actitudes
Percepciones
Creencias
Manejo del stress

Apoyo social
Relaciones
Sistema de salud
Estatus económico



**INTEGRATION OF NEURODYNAMICS INTO
NEUROREHABILITATION**

Rodríguez-López C., Da Rocha-Souto B., and Kern, N.

BROKEN MOVEMENT

“In our view, the more useful way to think about synergies in the context of stroke is to think about them as a loss of degrees of freedom or repertoire due to neural damage”

J. Krakauer, Broken Movement

THE NEUROBIOLOGY
OF MOTOR RECOVERY
AFTER STROKE

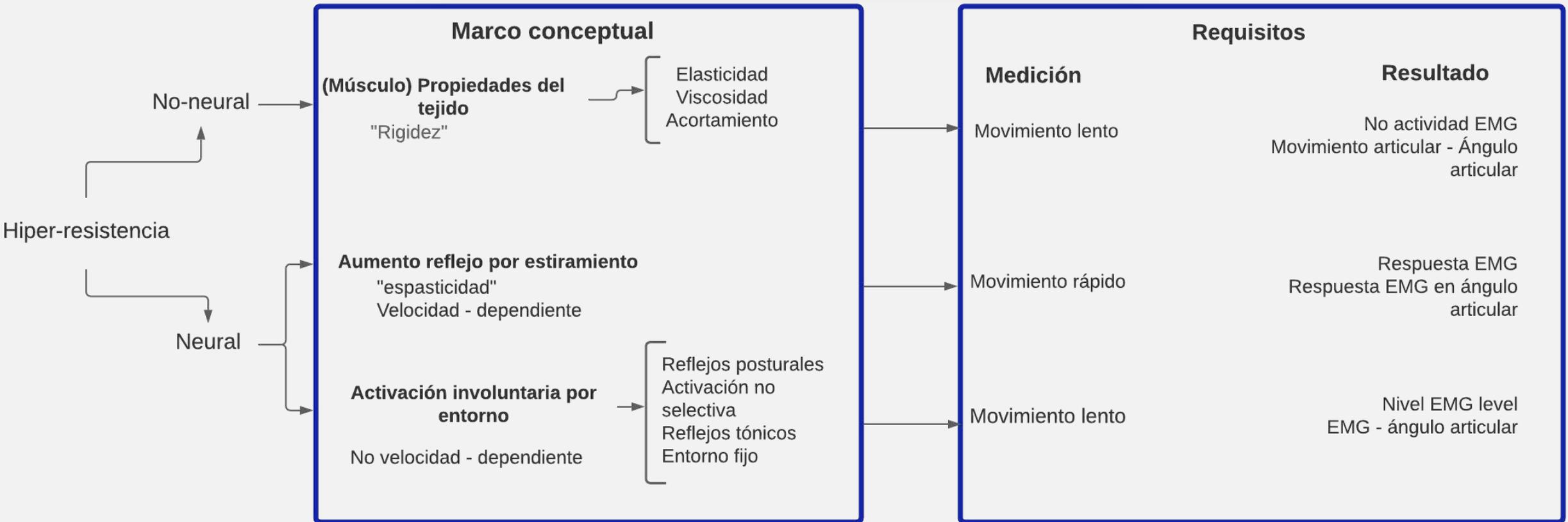
JOHN W. KRAKAUER
S. THOMAS CARMICHAEL



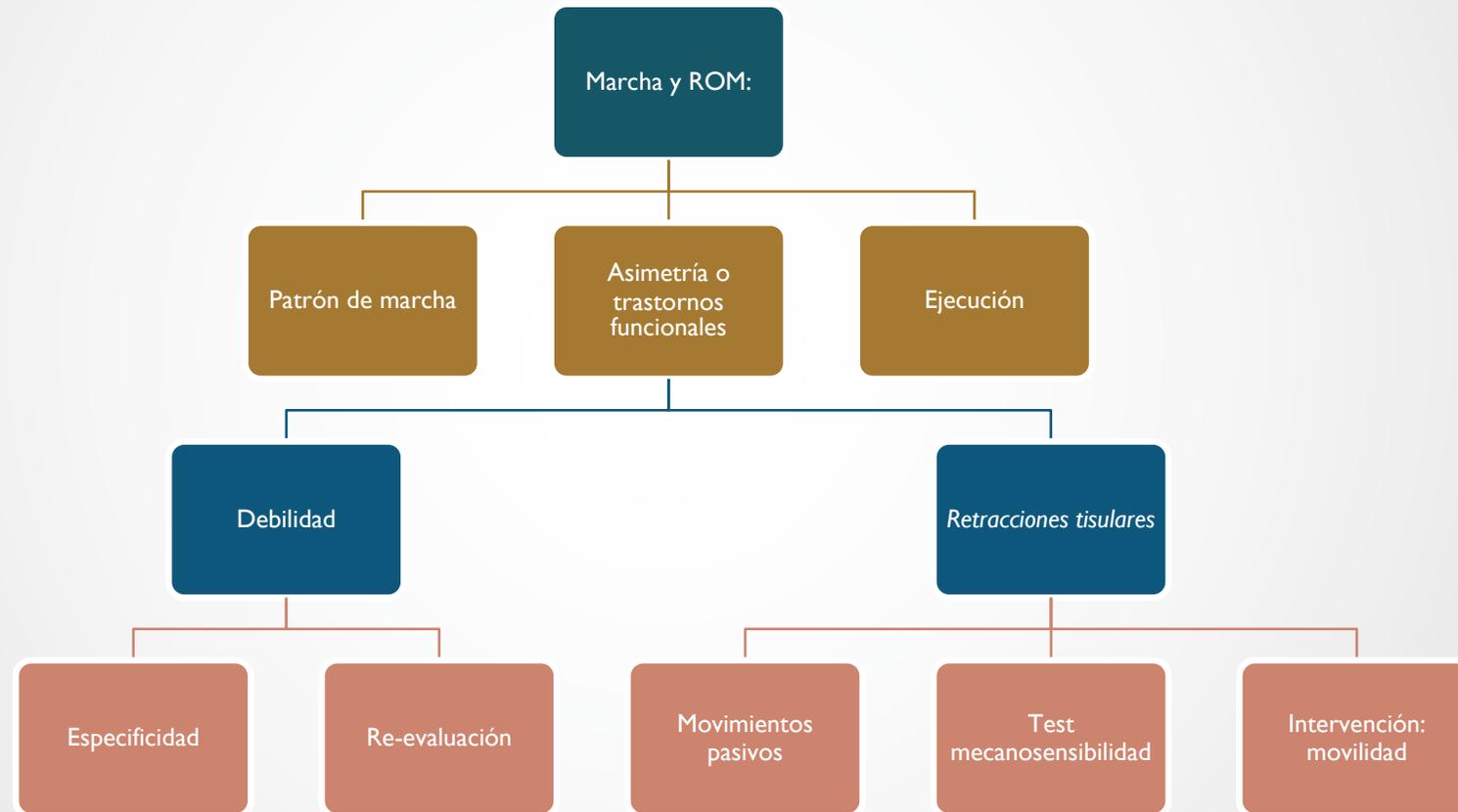
European consensus on the concepts and measurement of the pathophysiological neuromuscular responses to passive muscle stretch

J. C. van den Noort^{1,2*}, L. Bar-On^{1,3,4*}, E. Aertbeliën⁵, M. Bonikowski⁶, S. M. Braendvik^{7,8}, E. W. Broström⁹, A. I. Buizer¹, J. H. Burrige¹⁰, A. van Campenhout¹¹, B. Dan^{12,13}, J. F. Fleuren¹⁴, S. Grunt¹⁵, F. Heinen¹⁶, H. L. Horemans¹⁷, C. Jansen^{18,19}, A. Kranz²⁰, B. K. Krautwurst²¹, M. van der Krogt^{1,2}, S. Lerma Lara^{22,23}, C. M. Lidbeck⁹, J.-P. Lin²⁴, I. Martínez²⁵, C. Meskers^{1,2}, D. Metaxiotis²⁶, G. Molenaers¹¹, D. A. Patikas²⁶, O. Rémy-Néris²⁷, K. Roeleveld⁷, A. P. Shortland²⁸, J. Sikkens²⁹, L. Sloop^{1,2}, R. J. Vermeulen³⁰, C. Wimmer¹⁸, A. S. Schröder¹⁹, S. Schless^{3,4}, J. G. Becher⁷, K. Desloovere^{3,4} and J. Harlaar^{1,2}

2017



Grados de libertad



Ekso GT



Ventajas del trabajo con robot

Bipedestación y marcha precoz

Mayor tiempo de trabajo en bipedestación

Mayor nº de pasos

Control exhaustivo de parámetros

- patrón correcto
- evaluación-reevaluación-planificación

Diferentes entornos



The role of robotic gait training and tDCS in Friedrich ataxia rehabilitation

A case report

Simona Portaro, MD, PhD, Margherita Russo, MD, PhD, Alessia Bramanti, BioEng, Antonio Leo, MSc, Luana Billeri, MSc, Alfredo Manuli, MSc, Gianluca La Rosa, MSc, Antonino Naro, MD, PhD, Rocco Salvatore Calabrò, MD, PhD*



Case Report

Effectiveness of Robotic Exoskeleton-Assisted Gait Training in Spinocerebellar Ataxia: A Case Report

San-Ha Kim¹, Jae-Young Han², Min-Keun Song², In-Sung Choi¹ and Hyeng-Kyu Park^{1,*}

Matsushima et al. BioMed Eng OnLine (2021) 20:90
<https://doi.org/10.1186/s12938-021-00929-w>

BioMedical Engineering
OnLine

RESEARCH

Open Access



Gait training with a wearable curara® robot for cerebellar ataxia: a single-arm study

Akira Matsushima^{1*}, Yoichi Maruyama², Noriaki Mizukami³, Mikio Tetsuya⁴, Minoru Hashimoto^{4,5} and Kunihiro Yoshida^{1,6}

¿Qué cambios se producen durante el uso de un exoesqueleto?

¿Se produce la plasticidad?

¿Pueden influir en la plasticidad estos cambios?

Diferenciación



 Historia clínica

 Diagnóstico diferencial del dolor

 Requisitos para el movimiento

- Nocicepción
- Mecánica neural
- Sensibilización central
- Desafrentación
- Componente mecánico (ROM)
- Mecanosensibilidad
- Perfil somatosensorial

Mbody

V JORNADAS DE PROMOCIÓN PARA LA AUTONOMÍA PERSONAL EN ENFERMEDADES RARAS
«CONTEXTO ACTUAL EN EL CONOCIMIENTO DE LAS ATAXIAS»

Burgos – 15 y 16 de noviembre de 2022



“It takes a crowd to draw a crowd”
NAF

“Me vuelvo a sentir persona”
F



desarrollo@mbodycr.com

Mbody^{CR}



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MINISTERIO DE DERECHOS SOCIALES Y AGENDA 2030



SECRETARÍA DE ESTADO DE DERECHOS SOCIALES



AGENDA 2030



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3 SALUD Y BIENESTAR