Protocolos RM na Doença de Parkinson

Nuno Loução
Clinical Scientist
Philips Healthcare
Outubro 20, 2017

innovation + you

PHILIPS

Objectivo

- Protocolos de fábrica Philips para Doença de Parkinson

Obrigado pela vossa atenção.

Biomarcadores imagiológicos

- Biomarcadores são características quantitativas que são usadas como indicadores de estados biológicos ou patológicos.

- Na Neuro, os biomarcadores são medidas derivadas das imagens que refletem a presença de doenças ou o grau de severidade e que podem ser usadas para um diagnóstico precoce, prognóstico ou para monitorizar a resposta à terapêutica.

- Espera-se que com os biomarcadores se consiga detectar precocemente as caracteristicas neuropatológicas e os mecanismos subjacentes à neuro degeneração na Doença de Parkinson e correlacionar com a progressão da doença, por forma a possibilitar a monitorização do estado da doença.

- Os biomarcadores têm de ser confirmados por estudos independentes.

Method	Techniques	Information	Changes in PD
Structural	T1-w, T2-w, IR, MT	Morphometry	SN: variable volume changes Cortex: mild reduction in volume and thickness
Neuromelanin	Spin echo T1-w	Presence of melanin-containing cells	Reduced signal intensity
Magnetization transfer	Images with (M_T) and without (M_0) MT pulse	Degree of myelination, axonal density	Reduced MT ratio (MTR = $M_0 - M_T/M_0$)
Relaxometry	T2/T2* measurements	Brain iron	Reduced T2/T2* Increased R2/R2*
Susceptibility-weighted	Phase images	Brain iron	Increased susceptibility due to iron load
Diffusion	DTI	Diffusion of water in biological tissues	Reduced FA
Tractography	DTI	Fibre tract-specific reconstruction	Reduced probability of connections
Functional	Resting state BOLD fMRI	Functional connectivity within brain networks	Reduced FC in sensorimotor Increased FC in associative
MR spectroscopy	^{1}H MRS	NAA, Cho, mIns, GABA, Glx, GSH, lactate	Trend for metabolite reduction
	^{31}P MRS	Energy metabolism: ADP, PCr/ATP	Decreased ATP in midbrain
Perfusion	ASL	rCBF	Reduced in cortex, Variable in basal ganglia

^{1}H MRS, proton magnetic resonance spectroscopy; ^{31}P MRS, phosphorus magnetic resonance spectroscopy; ADP, adenosine diphosphate; ASL, arterial spin labelling; ATP, adenosine triphosphate; BOLD, blood oxygen level-dependent contrast; Cho, choline-containing compounds; DTI, diffusion tensor imaging; FA, fractional anisotropy; FC, functional connectivity; fMRI, functional magnetic resonance imaging; Glx, glutamate/glutamine; GSH, glutathione; IR, inversion recovery; mIns, *myo*-inositol; MT, magnetization transfer; MTR, magnetization transfer ratio; NAA, *N*-acetylaspartate; rCBF, regional cerebral blood flow; PCr, phosphocreatine; SN, substantia nigra; T2, T2 relaxation time; T2*, gradient echo T2 relaxation time; T1-w, T1-weighted; T2-w, T2-weighted; R2, T2 relaxation rate; R2*, T2* relaxation rate.

Fonte: Pyatigorskaya, N., et al. *A review of the use of magnetic resonance imaging in Parkinson's disease*. 2014.

Colaboração Hospital de Santa Maria - Philips

RESEARCH ARTICLE

Substantia Nigra Neuromelanin-MR Imaging Differentiates Essential Tremor From Parkinson's Disease

Sofia Reimão, MD,[1,2] Patrícia Pita Lobo, MD,[2,3,4] Dulce Neutel, MD,[2,3] Leonor Correia Guedes, MD,[2,3,4] Miguel Coelho, MD,[2,3] Mário M. Rosa, MD,[2,3,5] Pedro Azevedo, MSc,[6] Joana Ferreira, MSc,[6] Daisy Abreu, MSc,[2] Nilza Gonçalves, MSc,[2] Rita G. Nunes, PhD,[6] Jorge Campos, PhD,[1] and Joaquim J. Ferreira, PhD[2,3,4,5*]

ORIGINAL ARTICLE

Substantia nigra neuromelanin magnetic resonance imaging in *de novo* Parkinson's disease patients

S. Reimão[a,b], P. Pita Lobo[b,c], D. Neutel[b,c], L. Correia Guedes[b,c], M. Coelho[b,c], M. M. Rosa[b,c,d], J. Ferreira[e], D. Abreu[b], N. Goncalves[b], C. Morgado[a], R. G. Nunes[e], J. Campos[a] and J. J. Ferreira[b,c,d]

PHILIPS

Substantia Nigra

Imaging protocol

A combined neuromelanin and iron quantification MR protocol was performed simultaneously in a 3.0-T Phillips scanner (Philips Achieva; Philips Medical Systems, Best, The Netherlands). The neuromelanin-sensitive pulse sequence parameters were similar to those previously described by Sasaki *et al.* [1]: T1-

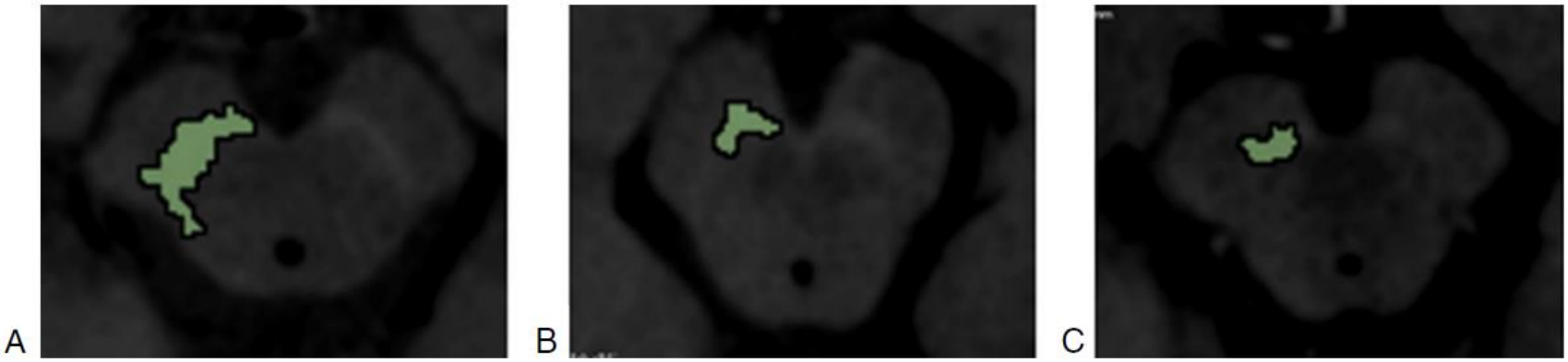


Fig. 2. Neuromelanin (NM) area selection on NM-sensitive MRI of the SN of a healthy control (A), a de novo PD patient (B) and a LSPD (C) patient.

The T2* relaxation data were acquired with a multiecho fast field echo (FFE) sequence with seven equally spaced echoes with a spacing of 4.7 ms, starting from 13.8 ms; repetition time 1406 ms, flip angle 18°; 28 slices; slice thickness 4 mm; gaps 1 mm; matrix size 288 × 160; field of view 240 × 180 mm^2; and acquisition time 4 min. Images were acquired in axial orientation parallel to the comissures line and covering the whole brain.

PHILIPS

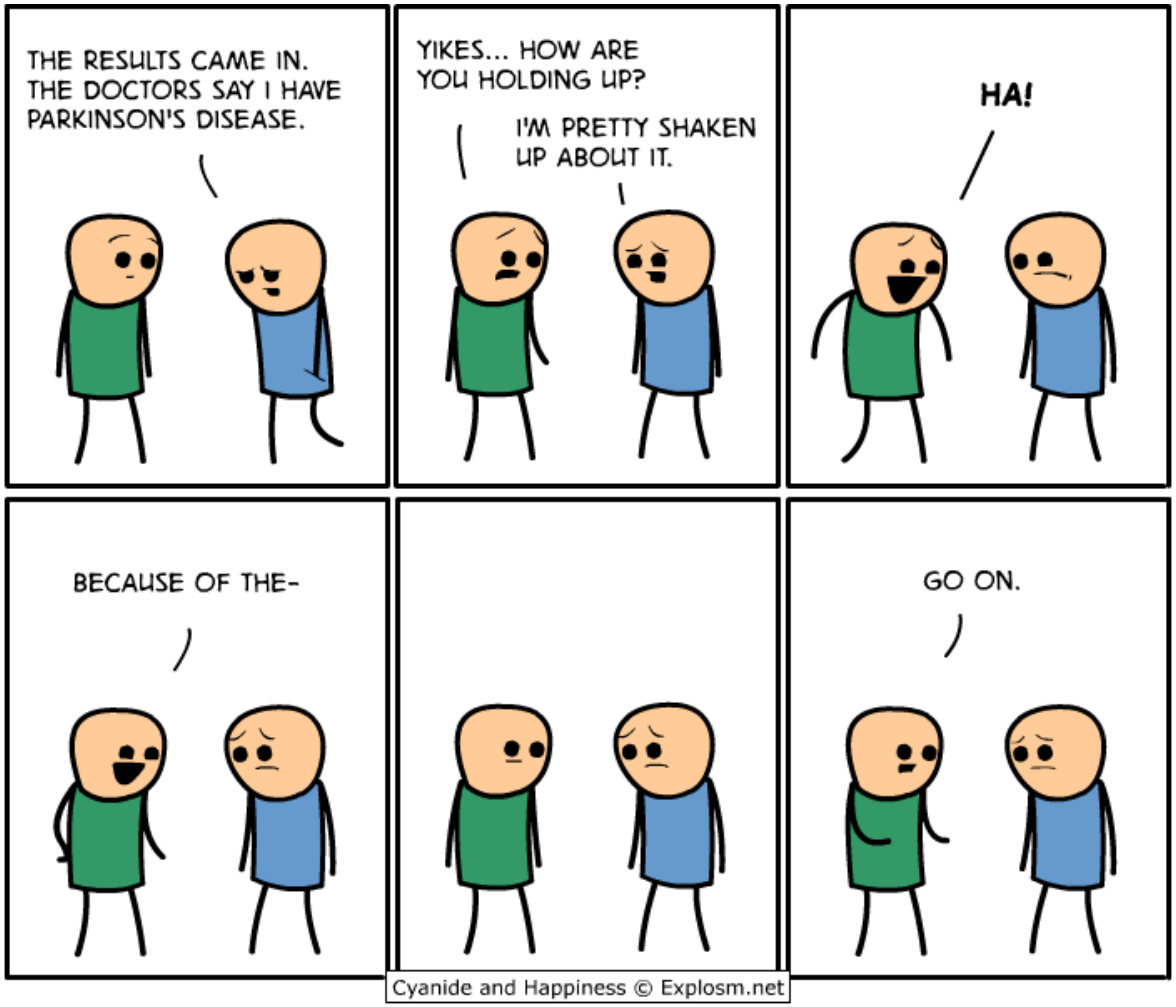
Conclusions: These findings provide evidence that high resolution diffusion tensor imaging in the substantia nigra distinguishes early stage, de novo patients with Parkinson disease (PD) from healthy individuals on a patient by patient basis and has the potential to serve as a noninvasive early biomarker for PD. *Neurology*® 2009;72:1378-1384

In the present study, with semi-automated MRI measures, we detected a stage-dependent progressive decrease in the SN-NM area of PD patients. A marked SN-NM area decrease occurred in parallel with other markers of disease severity. Our findings suggest that NM-sensitive MRI could be used as a potential biomarker for nigral degeneration and disease pro-

CONCLUSION: The current findings indicate that significant changes of ReHo in the motor and non-motor cortices have been detected in PD patients, independent of age, gender, education level, and structural atrophy. The present study thus suggests ReHo abnormalities as a potential biomarker for the diagnosis of PD and further provides insights into the biological mechanism of the disease.

PHILIPS

Obrigado pela vossa atenção.




PHILIPS