

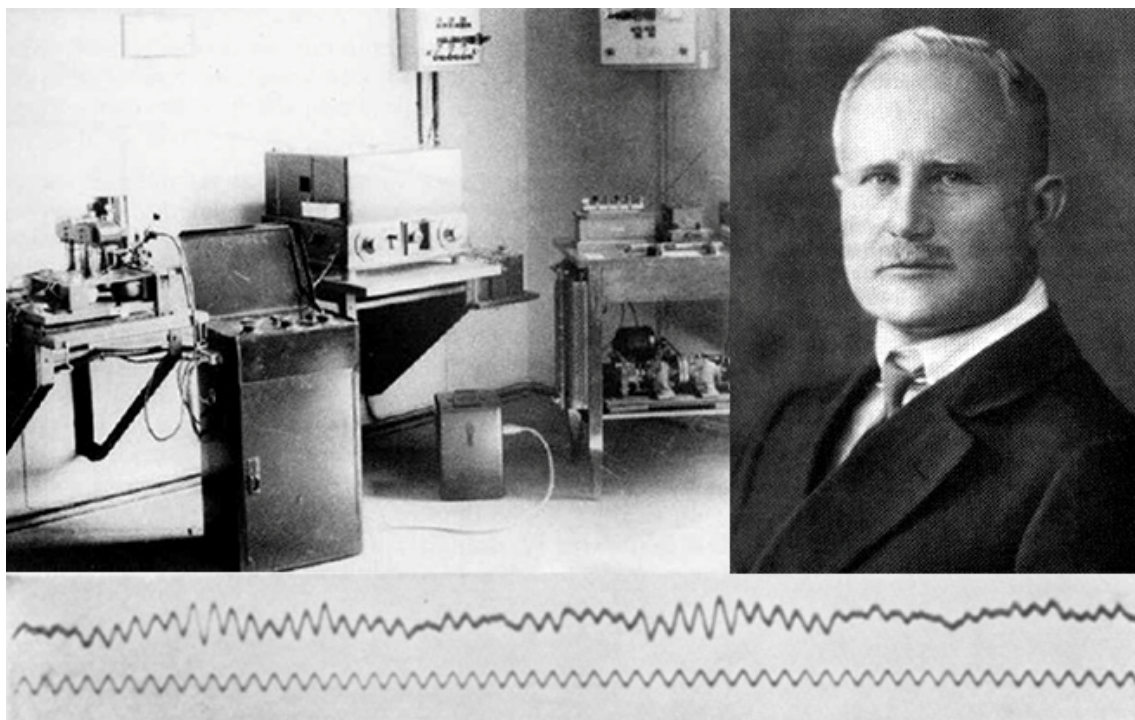


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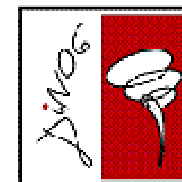
L'EEG



Arnaldi D

Clinica Neurologica, DINOGMI

Università di Genova e Ospedale policlinico
San Martino





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RESEARCH ARTICLE

Cortical Phosphorylated α -Synuclein Levels Correlate With Brain Wave Spectra in Parkinson's Disease

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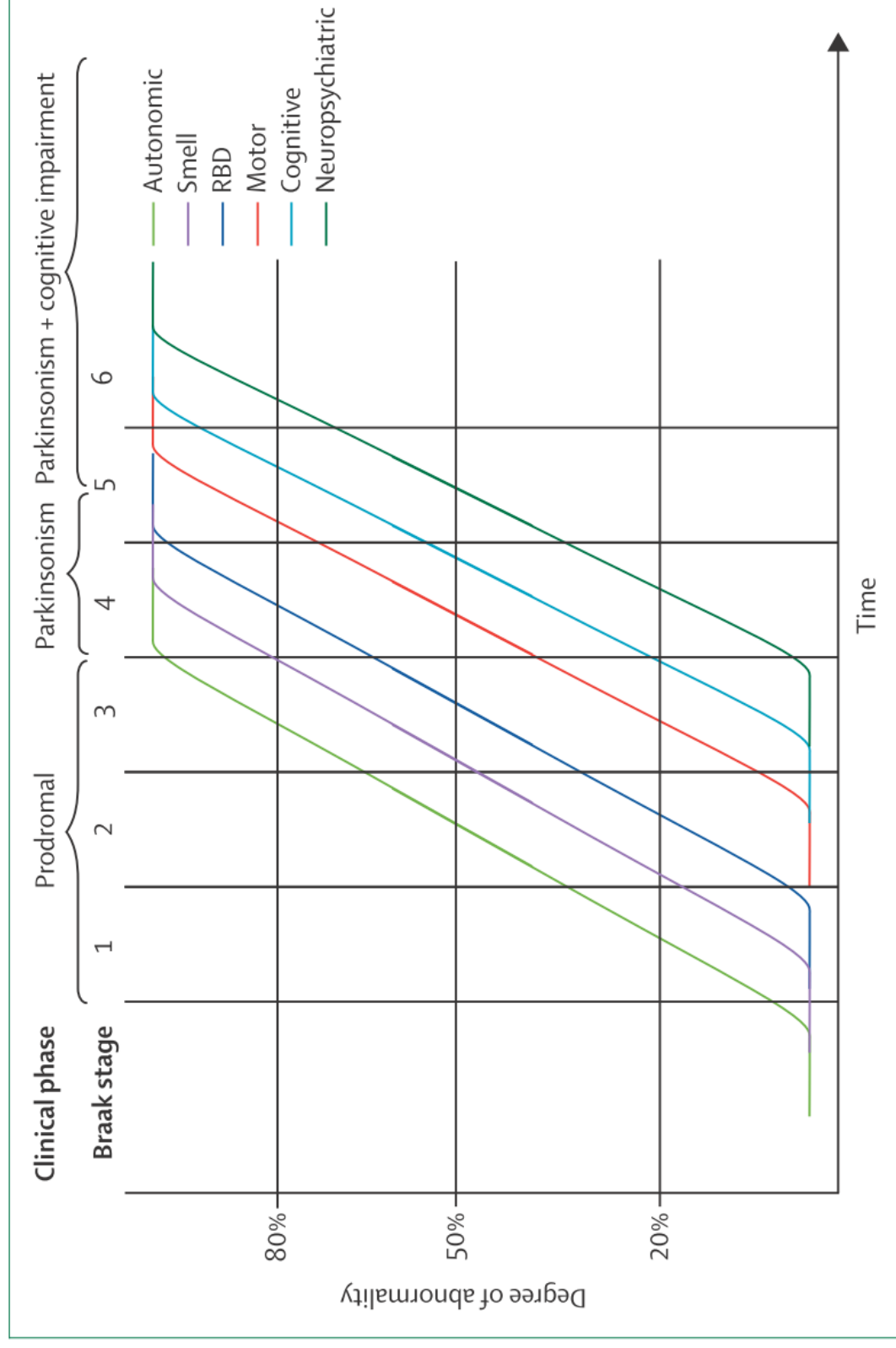
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Movement Disorders, Vol. 31, No. 7, 2016



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Theoretical evolution of clinical manifestations of Lewy body disease

Bradley F Boeve *Lancet Neurol* 2013; 12: 469-82



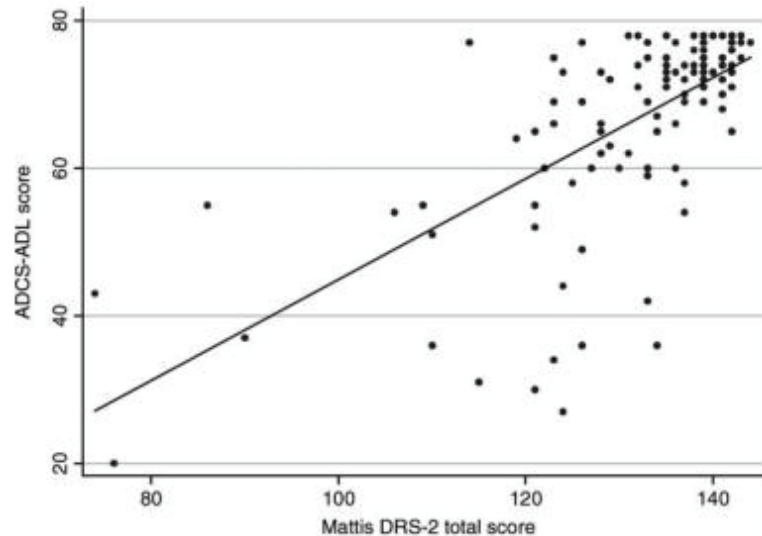
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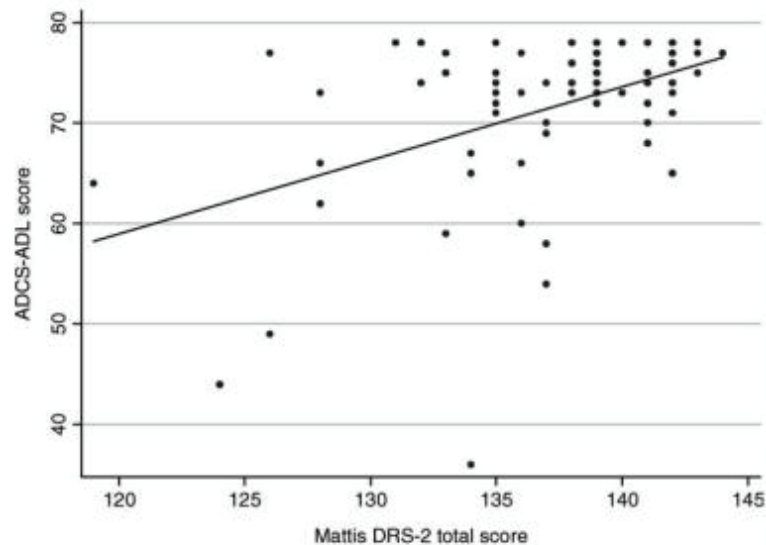
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Association Between Cognition and Function in Patients With Parkinson Disease With and Without Dementia

Mov Disord. 2010 July 15; 25(9): 1170–1176.



(a)



(b)

I disturbi cognitivi
correlano con le
funzioni della vita
quotidiana, anche in
soggetti **senza**
demenza



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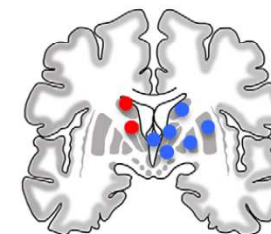
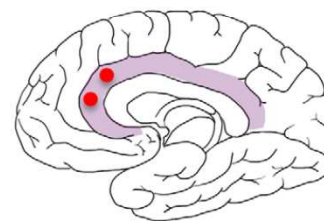
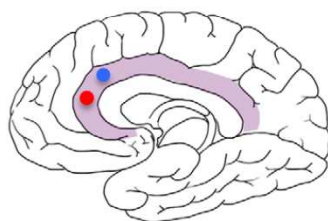
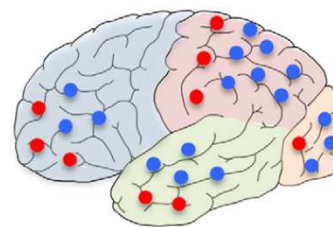
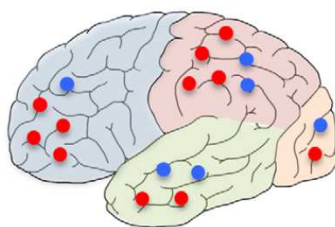
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Biomarkers for Dementia and Mild Cognitive Impairment in Parkinson's Disease

Movement Disorders, Vol. 31, No. 6, 2016

PD-MCI

PDD



[¹⁸F]-FDG PET



[^{99m}Tc]-HM-PAO, [¹²³I]-IMP,
or [^{99m}Tc] ECD SPECT

*Each dot represents a study reporting
hypometabolism or rCBF reduction*

PD-MCI

PDD

PD-MCI

PDD



Gray matter atrophy





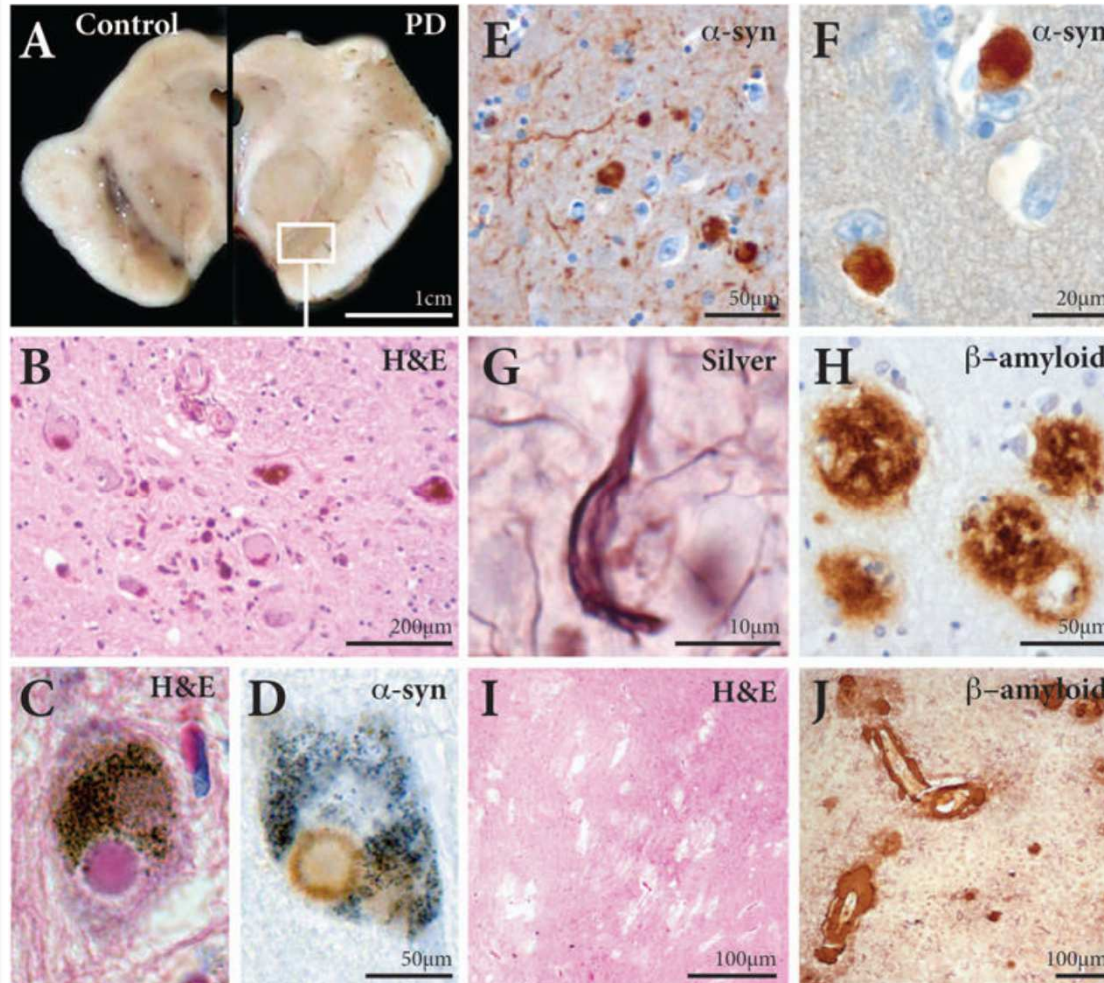
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The Neurobiological Basis of Cognitive Impairment in Parkinson's Disease

Mov Disord. 2014 April 15; 29(5): 634–650.



Depositi **corticali** di **alfa-sinucleina** sono stati correlati ai deficit cognitivi nel PD



Alterazioni permeabilità **membrana cellulare** e pertanto dell'attività **elettrica** dei neuroni



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Scopo del lavoro

Cortical Phosphorylated α -Synuclein Levels Correlate
With Brain Wave Spectra in Parkinson's Disease

Movement Disorders, Vol. 31, No. 7, 2016

- *'to test the hypothesis that quantitative EEG measures correlate with cortical levels of phosphorylated alpha-synuclein'*

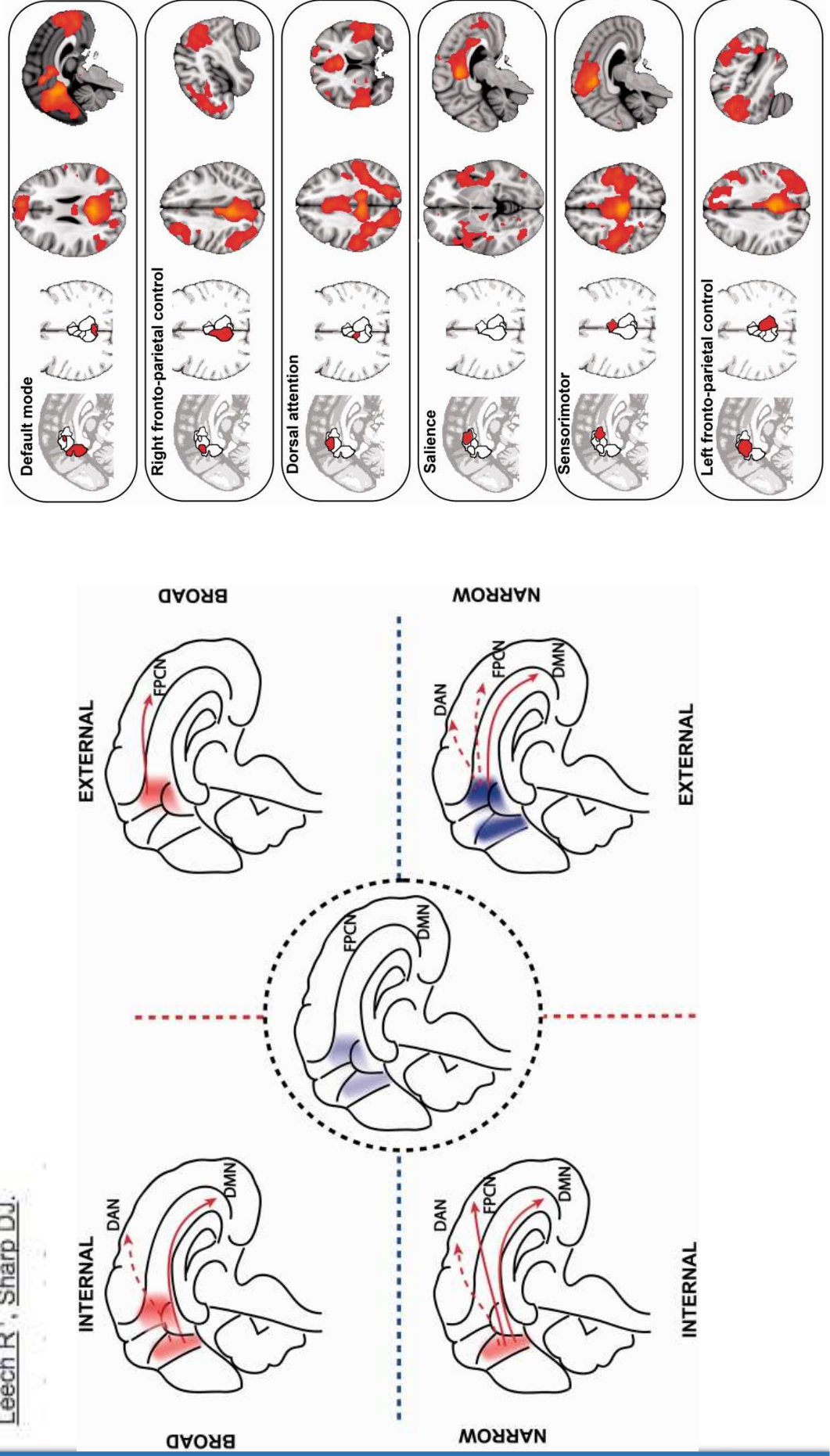


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Brain. 2014 Jan;137(Pt 1):12-32. doi: 10.1093/brain/awt162. Epub 2013 Jul 18.

The role of the posterior cingulate cortex in cognition and disease.

Leech R¹, Sharp DJ.





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Methods

- Arizona Study of Aging and Neurodegenerative Disorders (AZSAND)
- Brain donation program that performs prospective, standardized, regular longitudinal pre-mortem assessments until death, including **biennial EEG**
- Most recent EEG before death was used
- Patients with EEG **artifacts** and **psychoactive drugs** use on day of EEG were excluded

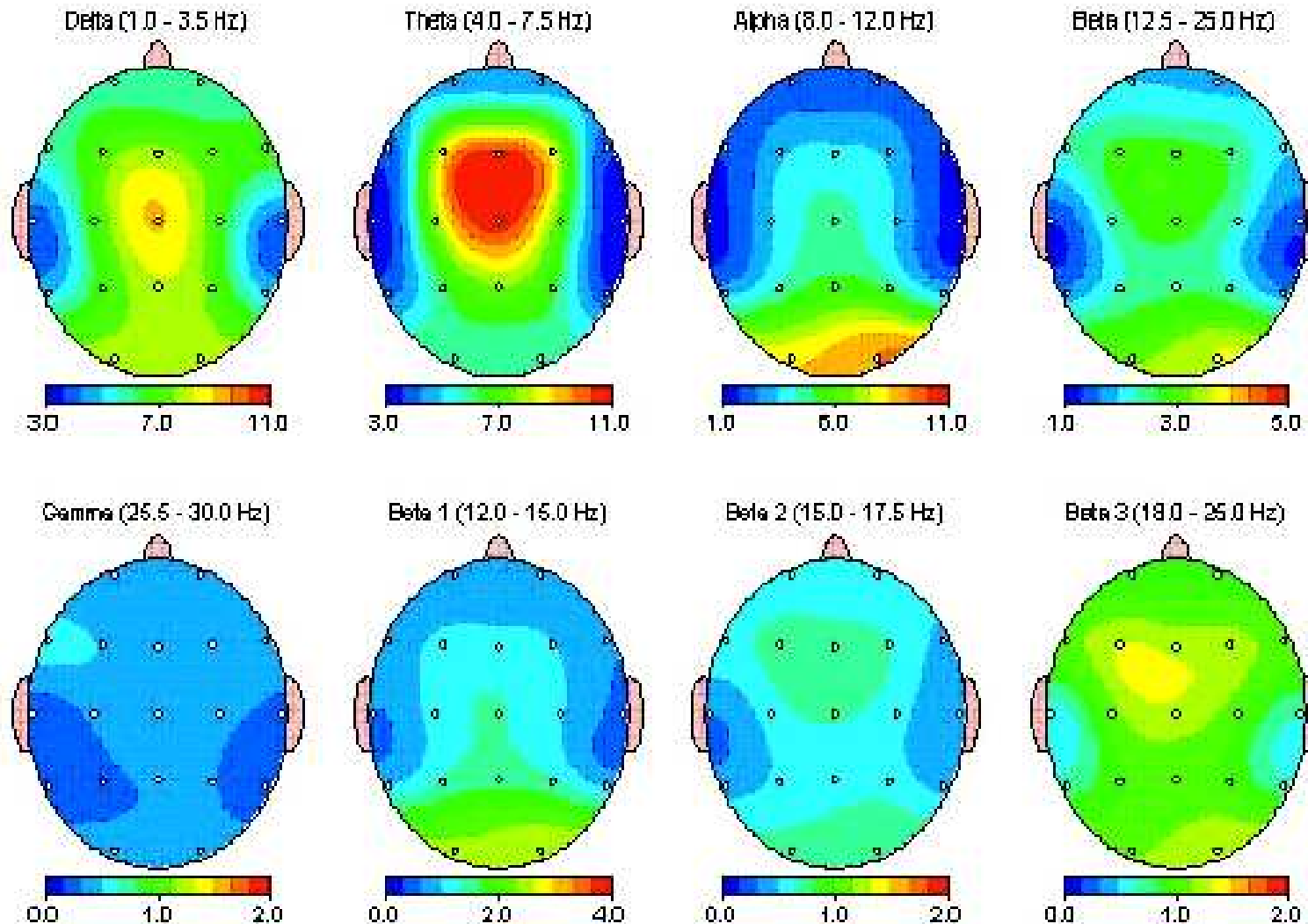


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Methods: QEEG





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Results: subjects

30 PDD, 6 PD-MCI and 8 cognitively normal PD

TABLE 1. Demographics of PD subjects used in study

Variable	Mean $\pm$ SD
Cases (n)	44
PMI (h)	3.8 (2.6)
Age at death (years)	81.1 (6.8)
% female	32
EEG to death interval (years)	1.15 (0.58)
L-dopa equivalents (mg)	732 (390)
H & Y stage	3.4 (1.1)
UPDRS part III (<i>off</i> state)	39 (16)
MMSE	23.6 (4.8)
% demented	68
apoE (% E4 alleles)	13.9

PMI, postmortem interval; SD, standard deviation..



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Results: Pearson's correlation

- $P < 0.001$ Bonferroni corrected

TABLE 2. r correlation measures between unfractionated biochemical, QEEG measures, MMSE score, H & Y stage, and UPDRS part I Thought Disorder

Variable (total)	BRF	Delta	Theta	Alpha	Beta	MMSE	H & Y	Thought
α -synuclein	-0.16	0.09	0.11	-0.10	-0.11	0.04	-0.16	0.22
<u>p-α-syn</u>	-0.52 ^a	0.64 ^a	0.33	-0.51 ^a	-0.34	-0.51 ^a	0.34	-0.19
Abeta peptide	-0.13	0.27	-0.07	-0.10	0.02	-0.17	-0.18	-0.12
p-tau	-0.23	0.23	0.13	-0.17	-0.15	0.09	0.07	-0.10
Synaptophysin	0.09	-0.21	0.04	0.13	-0.09	0.14	-0.20	0.04
SNAP-25	0.04	-0.13	-0.02	-0.05	0.22	-0.04	0.01	0.10

!!! No age or gender correction !!!

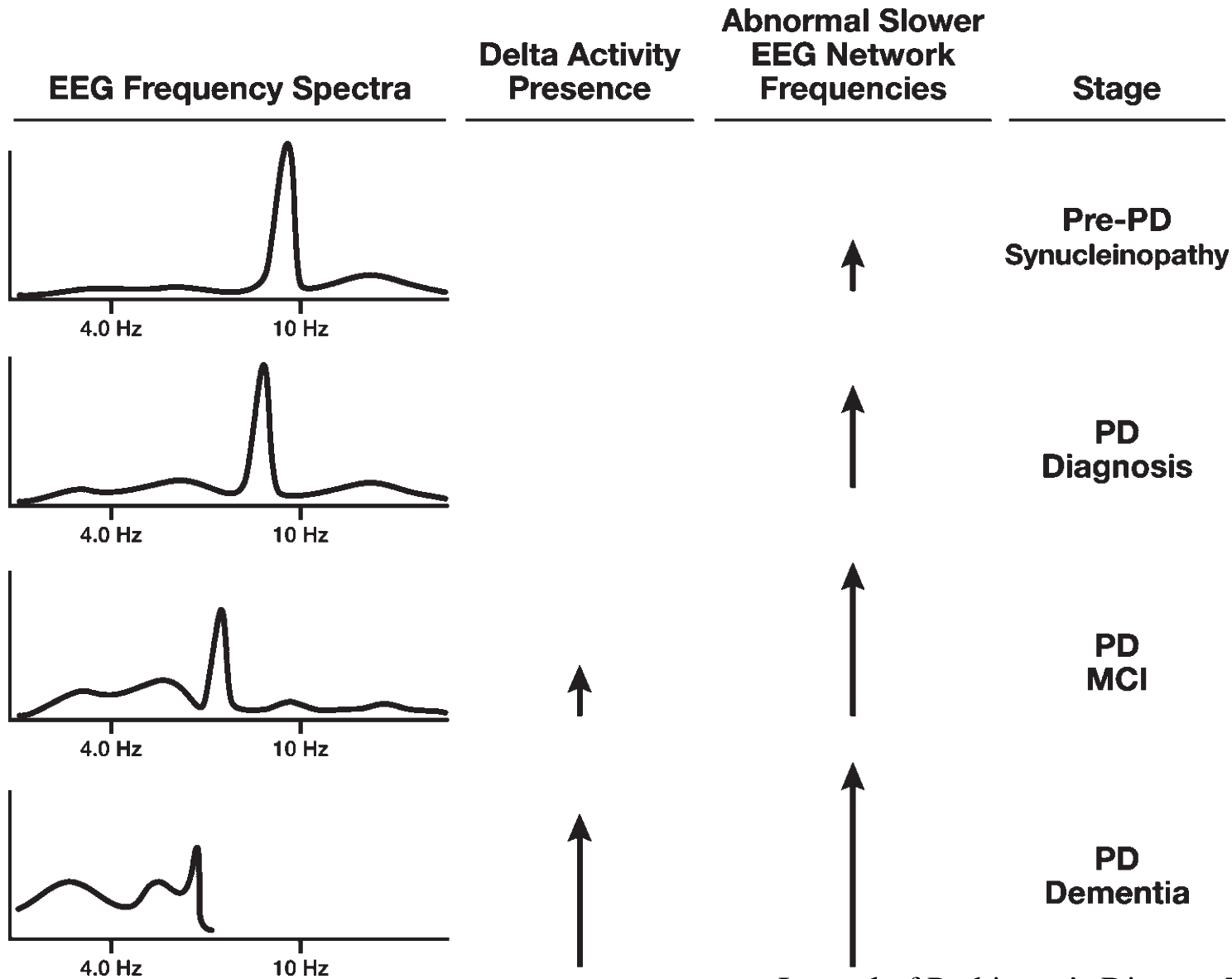


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Discussion



Journal of Parkinson's Disease 5 (2015) 117–124



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Discussion

Neuropsychological test change	Background rhythm frequency change	Delta bandpower change	Theta bandpower change	Alpha bandpower change	Beta bandpower change
Mini mental status exam	0.04 $P = 0.76$	-0.27 $P = 0.03$	-0.08 $P = 0.50$	0.11 $P = 0.35$	0.12 $P = 0.35$
AVLT-LTM	0.46 $P < 0.001$	-0.59 $P < 0.001$	-0.16 $P = 0.19$	0.15 $P = 0.22$	0.38 $P = 0.001$
Stroop Word-Color interference	0.43 $P < 0.001$	-0.53 $P < 0.001$	-0.37 $P = 0.002$	0.43 $P < 0.001$	0.21 $P = 0.09$
Controlled oral word association	0.14 $P = 0.26$	-0.51 $P < 0.001$	-0.14 $P = 0.25$	0.27 $P = 0.03$	0.11 $P = 0.38$
Trails B (seconds)	-0.22 $P = 0.08$	0.39 $P = 0.002$	0.19 $P = 0.13$	-0.26 $P = 0.04$	-0.11 $P = 0.39$
Clock drawing	0.16 $P = 0.18$	-0.36 $P = 0.002$	-0.11 $P = 0.39$	0.18 $P = 0.14$	0.11 $P = 0.39$

AVLT-LTM = Auditory verbal learning test-Long term memory.



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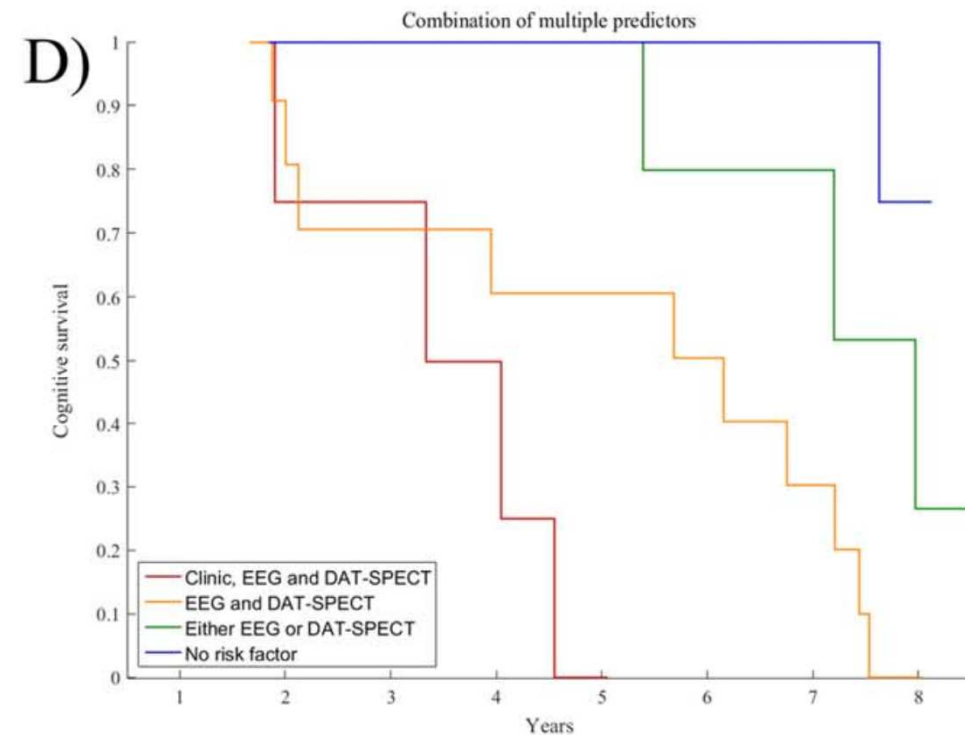
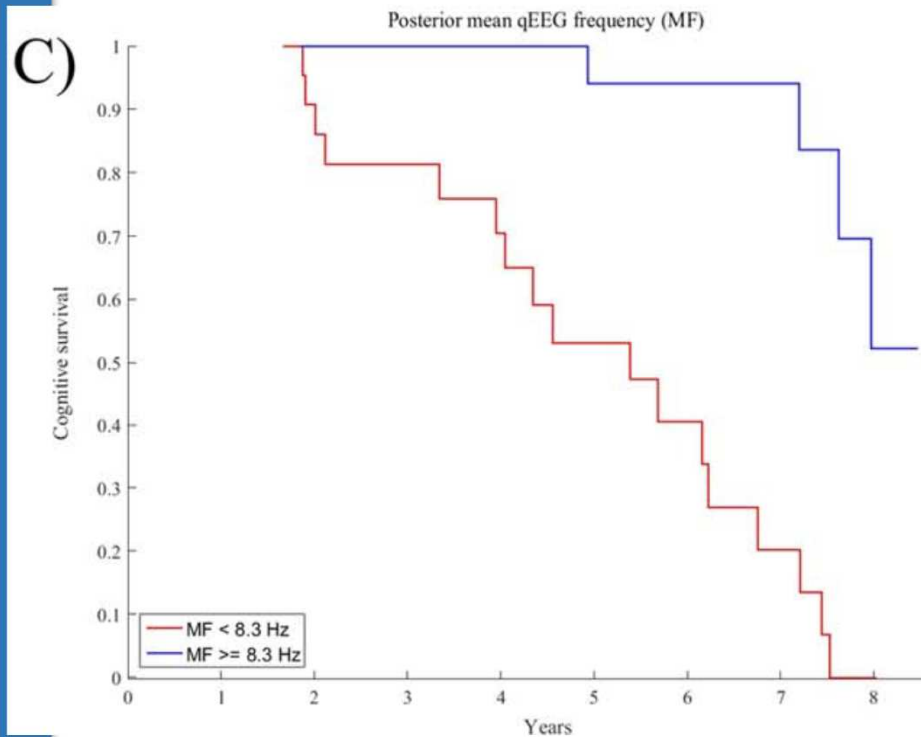
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Discussion

Mov Disord In press

Prediction of Cognitive Worsening in De Novo Parkinson's Disease: Clinical Use of Biomarkers

Dario Arnaldi, MD ^{1*} Fabrizio De Carli, MS ² Francesco Famà, BhS,¹ Andrea Brugnolo, PhD,¹ Nicola Girtler, PsyD,¹ Agnese Picco, MD,¹ Matteo Pardini, MD,¹ Jennifer Accardo, MD,¹ Luca Proietti, MD,¹ Federico Massa, MD,¹ Matteo Bauckneht, MD,³ Silvia Morbelli, MD,³ Gianmario Sambuceti, MD,³ and Flavio Nobili, MD¹





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Conclusioni

- Il lavoro scelto ha dimostrato una correlazione tra l'**EEG** ed i depositi corticali di **alfasinucleina** fosforilata
- L'EEG è un esame di facile esecuzione, largamente disponibile ed economico
- **Alterazioni** EEG sono correlate con il **deficit cognitivo** nel PD e predicono il **peggioramento**
- L'esecuzione **routinaria** dell'EEG nei soggetti con PD potrebbe aiutare a stratificare i pazienti, fin dalla diagnosi, migliorandone la gestione clinica



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Grazie!!!!

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Flavio Nobili
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Andrea Brugnolo
Agnese Picco
Matteo Pardini
Federico Massa
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**Nuclear Medicine
IRCCS San
Martino-IST**

Silvia Morbelli
Matteo Bauckneht
Ambra Buschiazzo

