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Emerging concepts for web-based assessment of risk cohorts for Parkinson's disease

Alastair Noyce
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Preventive Neurology Unit
Wolfson Institute of Preventive Medicine
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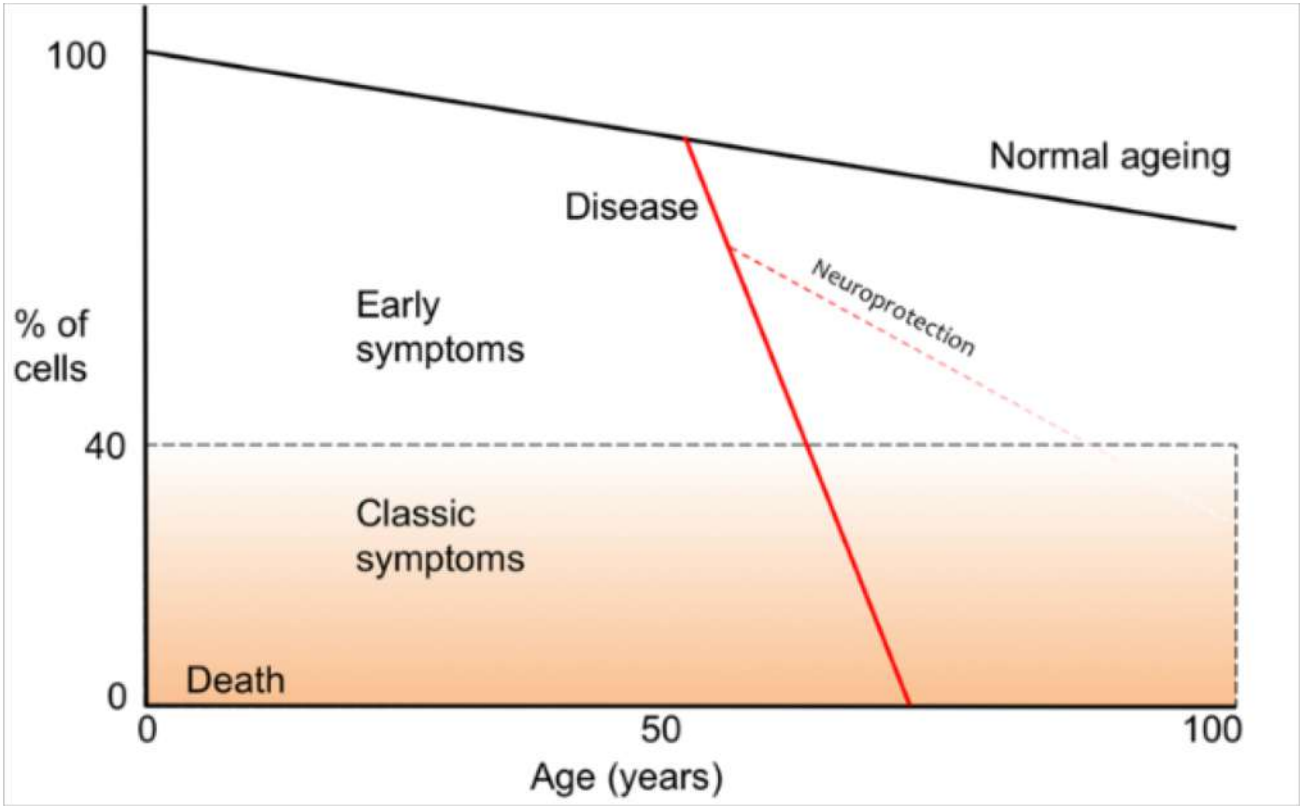
Queen Mary University of London



NO CURE & NO DRUGS THAT CHANGE THE UNDERLYING DISEASE COURSE

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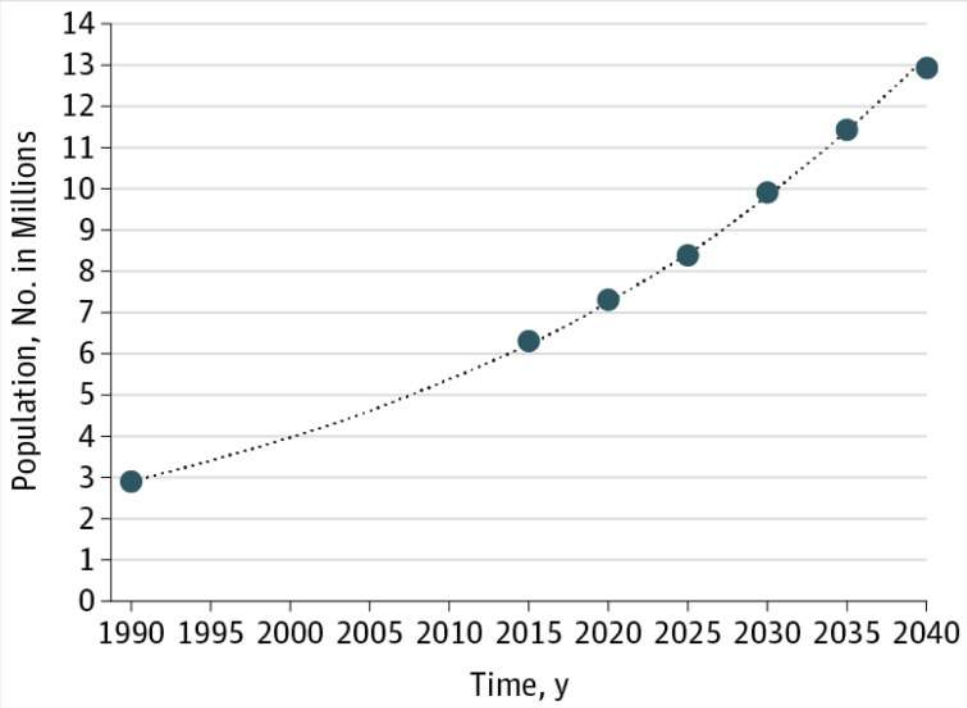
VIEWPOINT

The Parkinson Pandemic—A Call to Action



Dorsey, JAMA Neurol 2017

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Meta-Analysis of Early Nonmotor Features and Risk Factors for Parkinson Disease

ANN NEUROL 2012

Alastair J. Noyce, BMedSci, MRCP,[1,2] Jonathan P. Bestwick, MSc,[3]
Laura Silveira-Moriyama, PhD, MD,[1,4] Christopher H. Hawkes, MD, FRCP,[2]
Gavin Giovannoni, PhD, FRCP,[2] Andrew J. Lees, MD, FRCP,[1] and Anette Schrag, PhD, FRCP[1]

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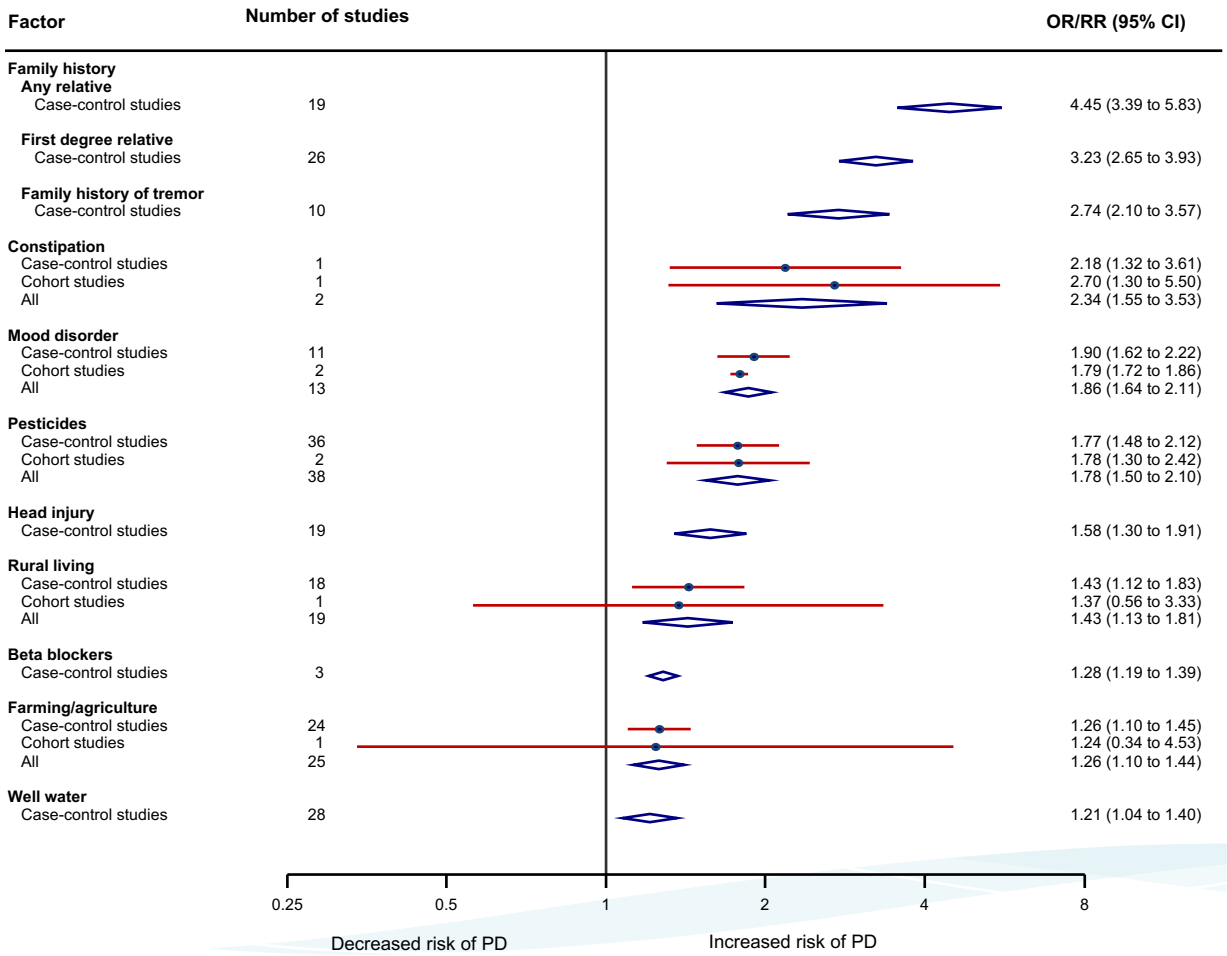

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Meta-Analysis of Early Nonmotor Features and Risk Factors for Parkinson Disease

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Alastair J. Noyce, BMedSci, MRCP,[1,2] Jonathan P. Bestwick, MSc,[3]
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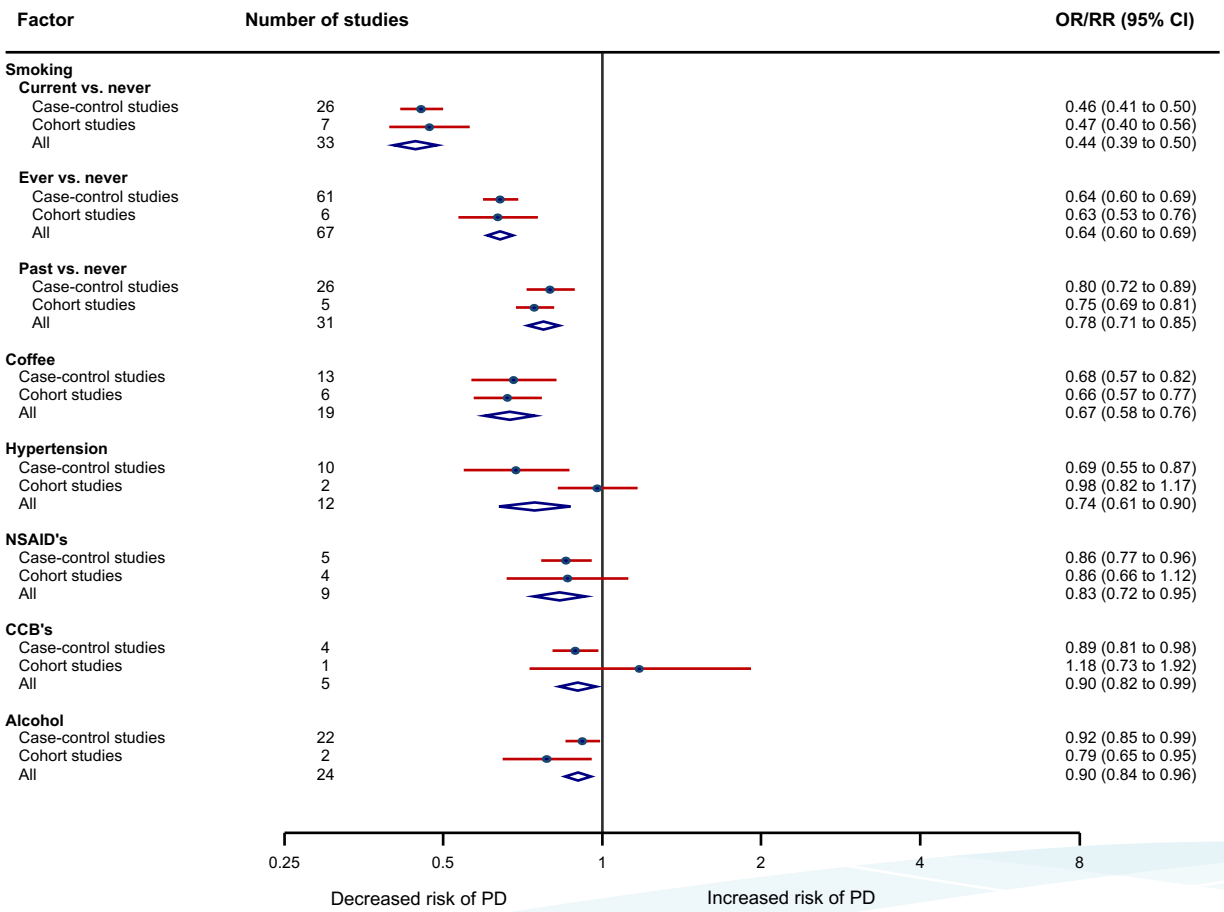

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JNNP Online First, published on February 4, 2016 as 10.1136/jnnp-2015-311890
Movement disorders

OPEN ACCESS

REVIEW

The prediagnostic phase of Parkinson's disease

Alastair John Noyce,[1] Andrew John Lees,[1] Anette-Eleonore Schrag[2]

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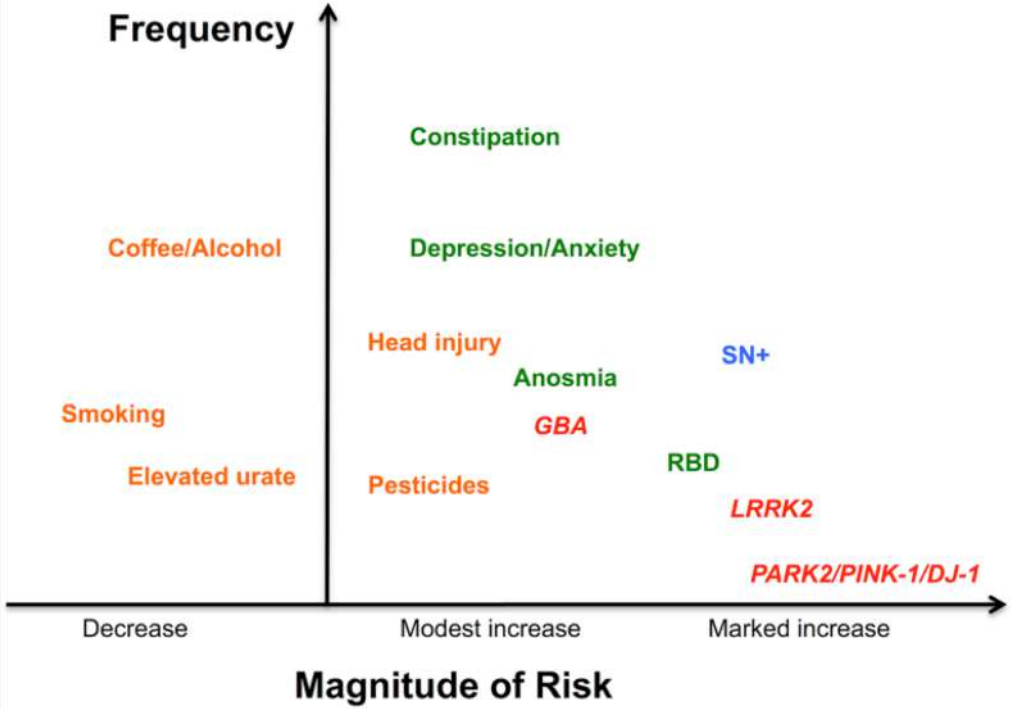

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Identification of risk and early features from published evidence

↓

Online population-based screening for these factors

↓

Prospective follow-up

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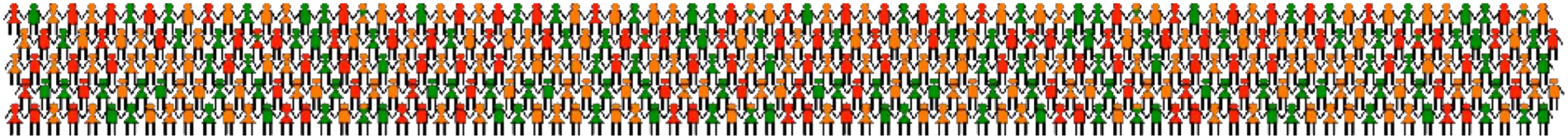
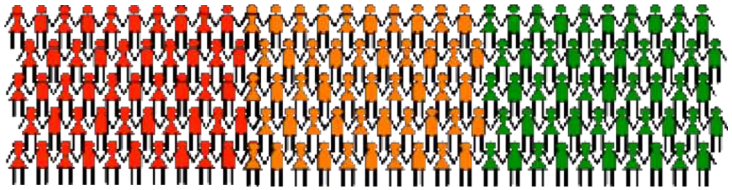


RISK KEY

- High
- Intermediate
- Low



Opened 11th April 2011
~1500 individuals registered
1323 eligible and included

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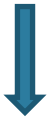
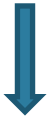
Age **Gender** **Family history of PD** **Head injury**
Medications **Hypertension**
Constipation **Depression/anxiety** **Erectile dysfunction**
Alcohol **Coffee** **Smoking**



REM-sleep Behaviour Disorder
Smell loss
Tapping speed
Genetic variation



Parkinson's disease

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Movement disorders

OPEN ACCESS

RESEARCH PAPER

PREDICT-PD: Identifying risk of Parkinson's disease in the community: methods and baseline results

Alastair J Noyce,[1,2] Jonathan P Bestwick,[3] Laura Silveira-Moriyama,[1,4] Christopher H Hawkes,[2] Charles H Knowles,[2] John Hardy,[1] Gavin Giovannoni,[2] Saiji Nageshwaran,[5] Curtis Osborne,[2] Andrew J Lees,[1] Anette Schrag[5]

RESEARCH ARTICLE

PREDICT-PD: An Online Approach to Prospectively Identify Risk Indicators of Parkinson's Disease

Alastair J. Noyce, MRCP, PhD,[1,2] Lea R'Bibo, MSc, MRes,[1] Luisa Peress, BSc,[2] Jonathan P. Bestwick, MSc,[3] Kerala L. Adams-Carr, MB, BS, BA,[1,4] Niccolo E. Mencacci, MD,[1] Christopher H. Hawkes, FRCP, MD,[2] Joseph M. Masters, BSc,[2] Nicholas Wood, FRCP, PhD,[1] John Hardy, PhD,[1] Gavin Giovannoni, FRCP, PhD,[5] Andrew J. Lees, FRCP, MD,[1] and Anette Schrag, FRCP, PhD[1]*

TABLE 2. Longitudinal associations of baseline risk scores with UPSIT, RBDSQ, and tapping speed at year 3

	Higher risk	Lower risk	*P* value[a]
UPSIT score			
n	130	132	
Median (IQR)	30 (26-33)	33 (30-35)	<.001
<27 (%)	40 (31)	15 (11)	<.001
RBDSQ score			
n	140	139	
Median (IQR)	2 (1-4)	1 (0-3)	<.001
>5 (%)	33 (24)	10 (7)	<.001
KS score			
n	135	130	
Mean (95% CI)	51.3 (49.5-53.2)	55.5 (53.6-57.4)	.001
<44 (%)	40 (30)	17 (13)	.002

Every year participants asked for new diagnosis of PD or movement disorder (drug lists too).

Independent specialist diagnoses.

Positive answers followed up by telephone and in-person visit.

3 at year 1 1 at year 2 3 at year 3

7 in total

Baseline risk score and incident PD over 3 years

Hazard Ratio = 4.39 (95% CI 1.03-18.68; p=0.045)

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Take part

Parkinson's is on the rise.

We need healthy people aged 60-80 years to help us PREDICT-PD and get closer to a cure.

FIND OUT MORE

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~~Pre-Motor~~ Parkinson's disease?

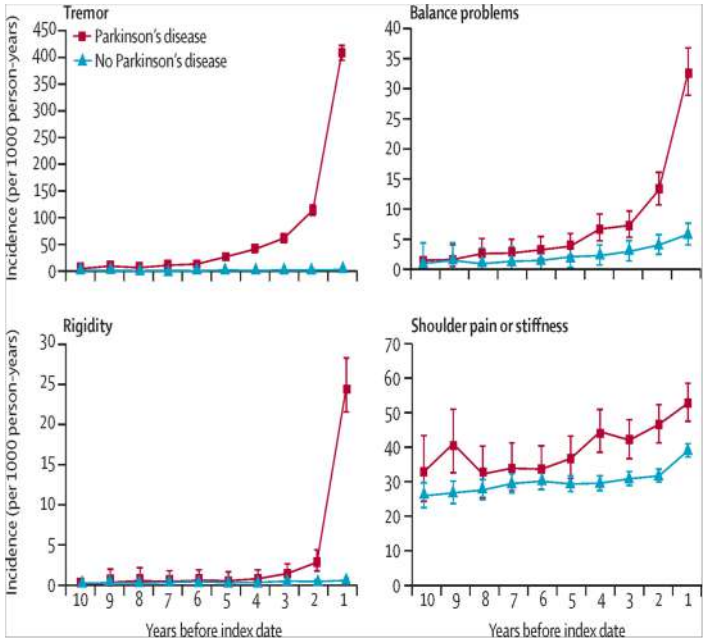
When Did Ray Kennedy's Parkinson's Disease Begin?

A. J. Lees

Department of Neurology, The Middlesex Hospital, Mortimer Street, London, U.K.

How does parkinsonism start? Prodromal parkinsonism motor changes in idiopathic REM sleep behaviour disorder

R. B. Postuma,[1,2] A. E. Lang,[3] J. F. Gagnon,[2,4] A. Pelletier[1,5] and J. Y. Montplaisir[2,6]



Prediagnostic presentations of Parkinson's disease in primary care: a case-control study

Anette Schrag, Laura Horsfall, Kate Walters, Alastair Noyce, Irene Petersen

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Movement disorders

OPEN ACCESS

RESEARCH PAPER

Subtle motor disturbances in PREDICT-PD participants

Alastair J Noyce,[1,2] Anette Schrag,[3] Joseph M Masters,[2] Jonathan P Bestwick,[4] Gavin Giovannoni,[2] Andrew J Lees[1]

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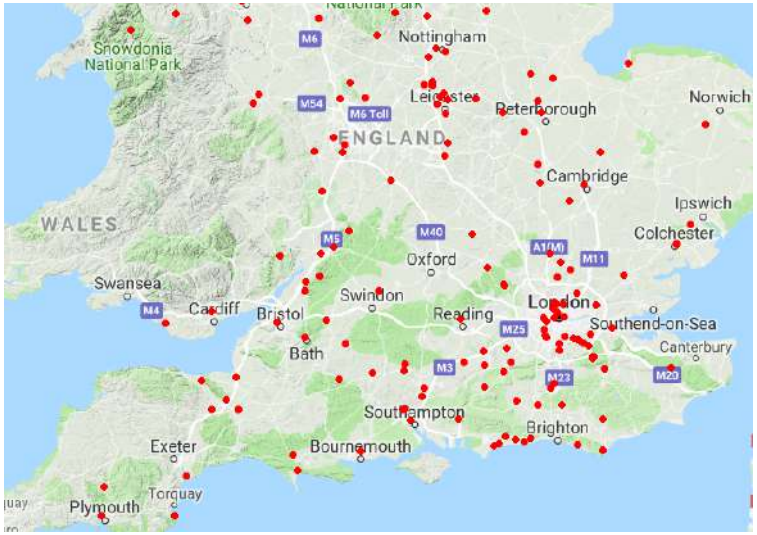
Table 2 Comparison of total motor MDS-UPDRS scores and MoCA scores, and proportion of participants meeting three definitions of mild parkinsonian signs, between higher and lower risk participants

	Higher risk	Lower risk	
n	74	111	p Value
Median MDS-UPDRS (IQR)	3 (1.0–5.5)	1 (0.0–3.0)	<0.001
Mild parkinsonism Berg definition n (%)	13 (17.6%)	7 (6.3%)	0.027
Mild parkinsonism Louis definition n (%)	23 (31.1%)	12 (10.8%)	0.001
Global impression n (%)			
0–1.0	55 (74.3%)	103 (92.8%)	
1.5–2.5	17 (23.0%)	7 (6.3%)	0.001
3+	2 (2.7%)	1 (0.9%)	
Median MoCA (IQR)	27 (26–28)	28 (26–29)	0.049

MDS-UPDRS, Movements Disorders Society Unified Parkinson's Disease Rating Scale; MoCA, Montreal Cognitive Assessment.



Motor prodrome:

- Follow up of participants seen in person
- Progression on BRAIN tapping test
- Wearable devices – PKG

GLOBAL KINETICS CORPORATION

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BRAIN test

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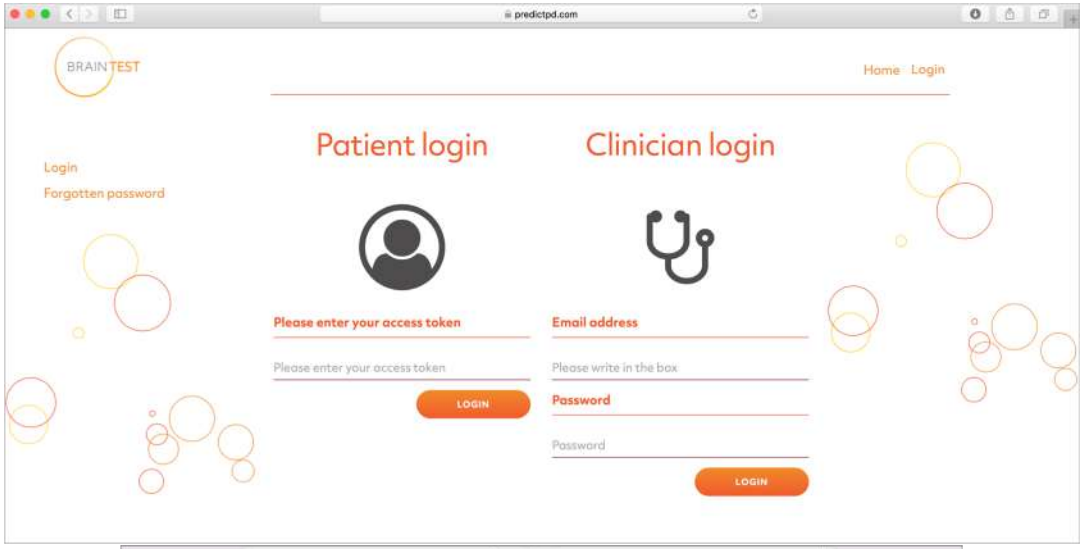

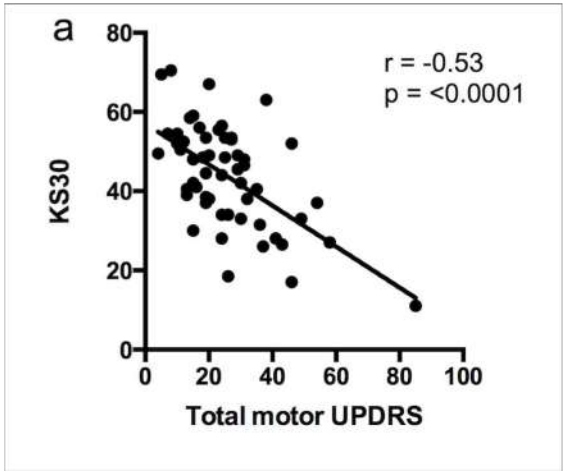

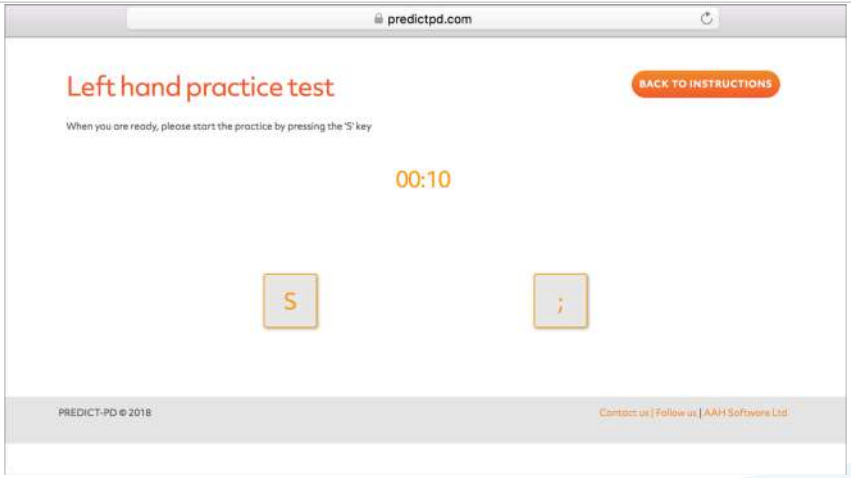

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Movement Disorders
Official Journal of the International Parkinson and Movement Disorder Society

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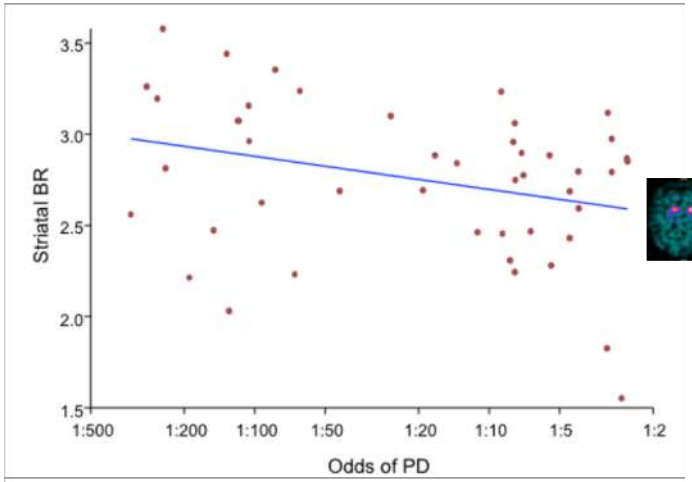
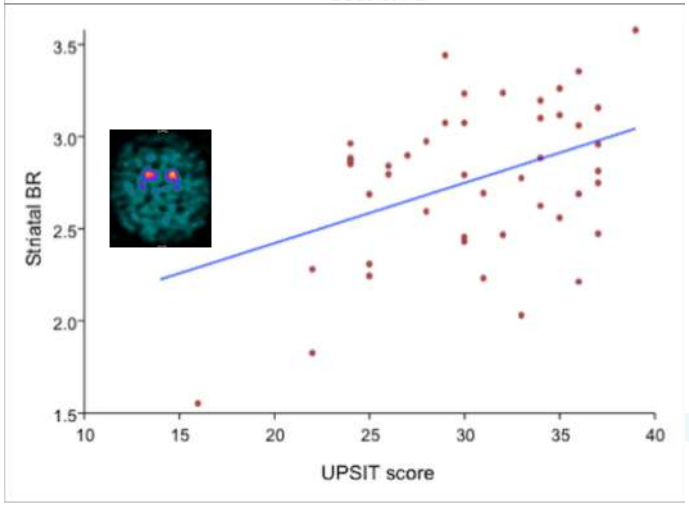
Brief Report | Open Access

Dopamine reuptake transporter–single-photon emission computed tomography and transcranial sonography as imaging markers of prediagnostic Parkinson's disease

Alastair J. Noyce MRCP, PhD, John Dickson PhD, Richard N. Rees MRCP, Jonathan P. Bestwick MSc, Ioannis U. Isaias MD, PhD, Marios Politis MD, PhD, Gavin Giovannoni FRCP, PhD, ... See all authors





Factor	Higher risk	Lower risk	*P* value
n	23	23	
Median age in years (IQR)	74.5 (69.7-78.9)	68.3 (66.7-71.1)	.003*
Males (%)	23 (100)	16 (70)	.009**
Median risk (odds 1/x and IQR)	5.5 (3.1-7.9)	105 (43-189)	<.001*
Mean worst SBR (95% CI)	2.6 (2.5-2.8)	2.9 (2.7-3.0)	.071***
Mean SN-max (95% CI)	0.22 (0.19-0.26)	0.14 (0.12-0.17)*	<.001***

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Other prediction strategies are available...

REVIEW

CME

MDS Research Criteria for Prodromal Parkinson's Disease

Daniela Berg, MD,[1*] Ronald B. Postuma, MD, MSc,[2*] Charles H. Adler, MD, PhD,[3] Bastiaan R. Bloem, MD, PhD,[4]

RESEARCH ARTICLE

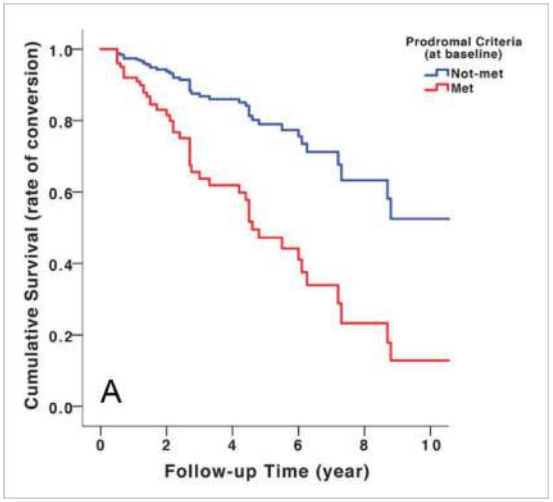
CME

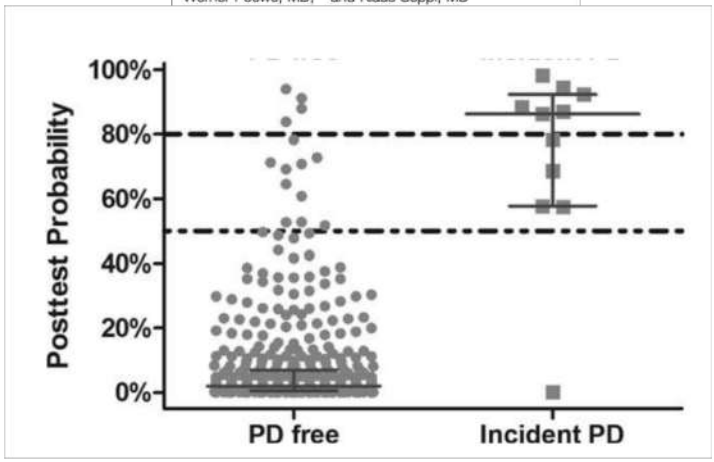
Validation of the MDS Research Criteria for Prodromal Parkinson's Disease: Longitudinal Assessment in a REM Sleep Behavior Disorder (RBD) Cohort

Seyed-Mohammad Fereshtehnejad, MD, MPH, PhD,[1,2] Jacques Y. Montplaisir, MD, PhD,[3,4] Amelie Pelletier, PhD,[5] Jean-François Gagnon, PhD,[3,6] Daniela Berg, MD,[7,8] and Ronald B. Postuma, MD, MSc[1,3*]

Prodromal Parkinson's Disease as Defined per MDS Research Criteria in the General Elderly Community

Philipp Mahlknecht, MD, PhD,[1,2] Arno Gasperi, MD,[3] Peter Willeit, MD, PhD,[1,4,5] Stefan Kiechl, MD,[1] Heike Stockner, MD,[1] Johann Willeit, MD,[1] Gregorio Rungger, MD,[3] Martin Sawires, MD,[1] Michael Nocker, MD,[1] Verena Rastner, MD,[1] Katherina J. Mair, MD,[1] Anna Hotter, MD,[1] Werner Poewe, MD,[1*] and Klaus Seppi, MD[1*]





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Other web-based initiatives

Vision in Parkinson's

Rapsodi

23andMe

FOX INSIGHT

YOUR EXPERIENCE FUELING RESEARCH

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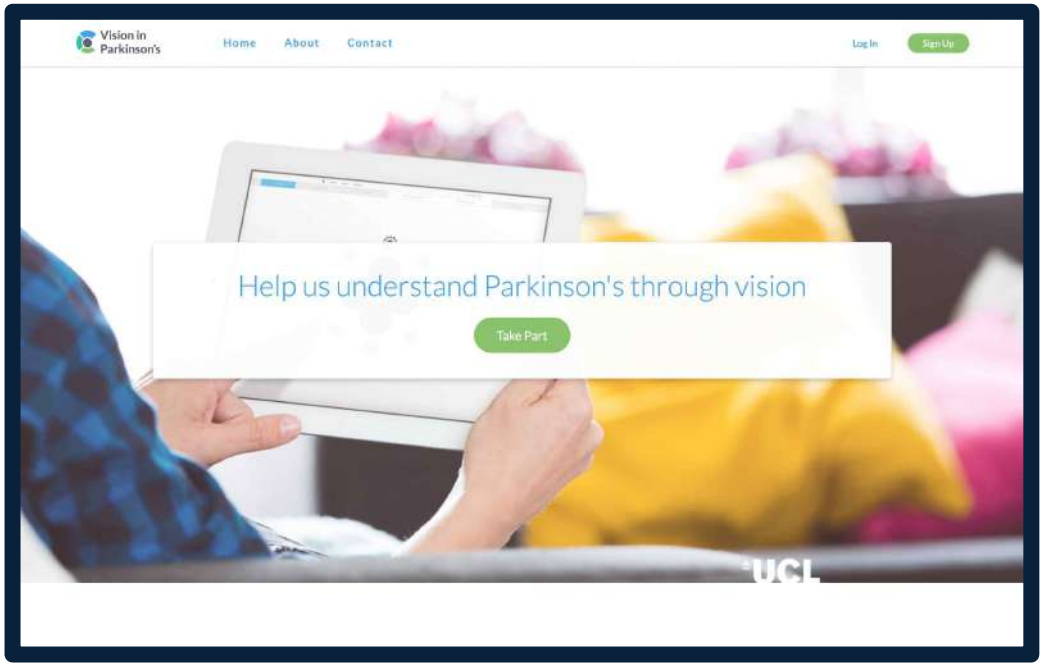
Vision in Parkinson's

Slides provided by Rimona Weil

UCL



https://vision-in-parkinsons.co.uk/

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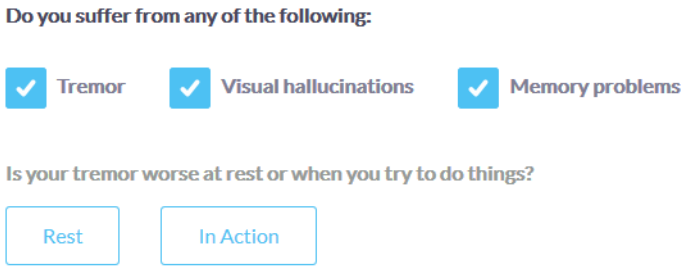
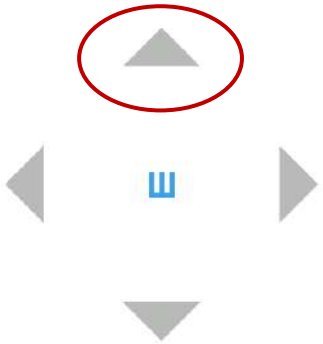
Assessments

Clinical questionnaire



Online visual acuity



Tapping test

Local group

n = 54
PD = 31
Controls = 23

Web-based group

n = 312
PD = 60
Controls = 252

Total

n = 366
PD = 91
Controls = 275

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Vision in Parkinson's

Slides provided by Rimona Weil

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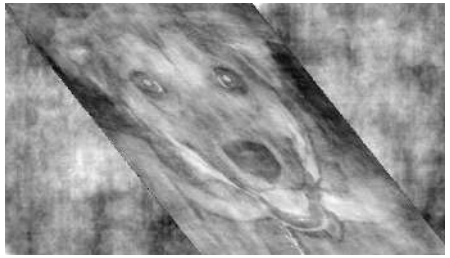
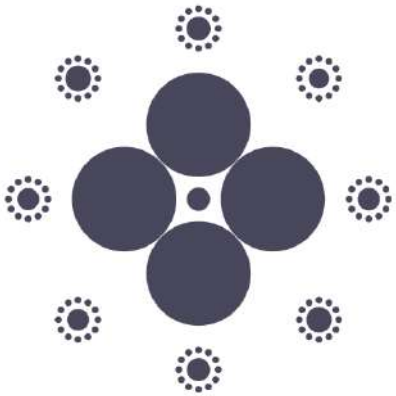
Cats & Dogs

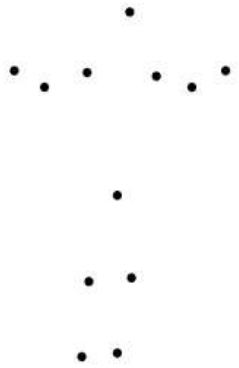


Find the horses

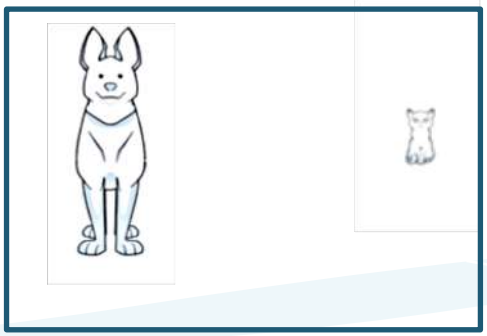
Circles illusion



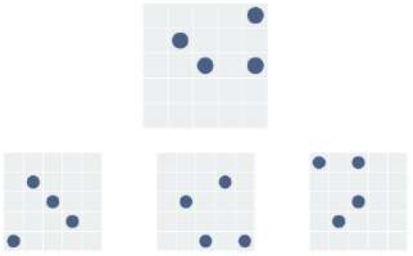
Biological motion



Snap



Match the grid



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Vision in Parkinson's

Slides provided by Rimona Weil

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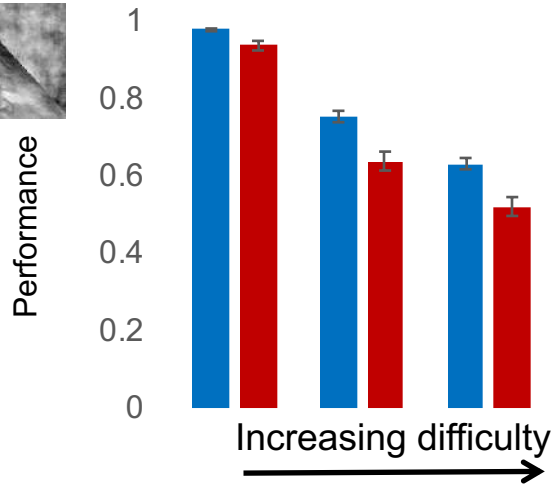
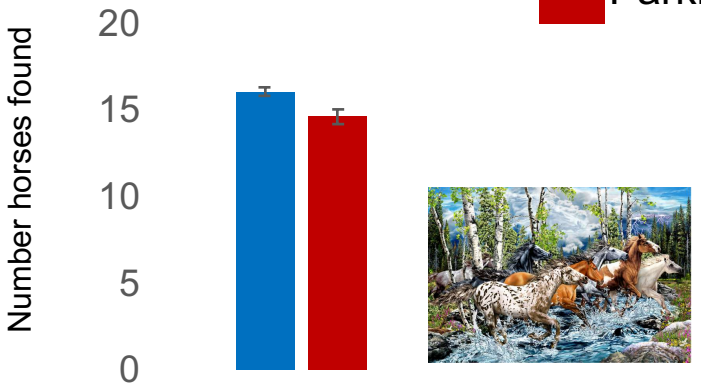
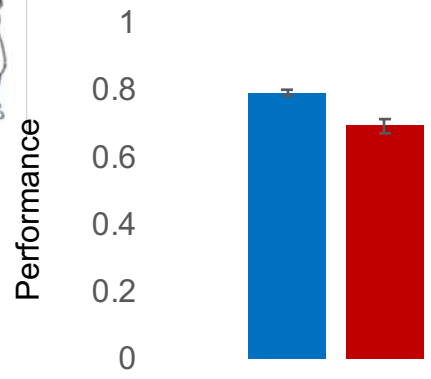
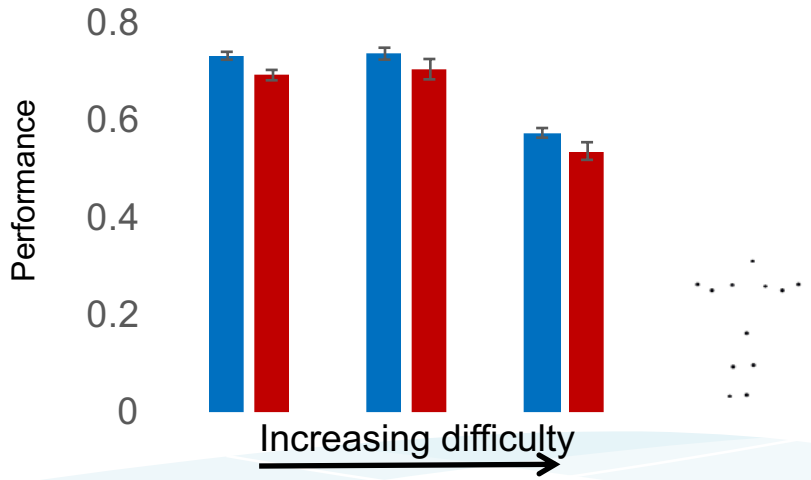


Controls: n=275

Parkinson's n= 91







Weil RS Mov Disord 2018

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Longitudinal study of visuo-perception in large numbers with genetic and clinical modifiers

- ~30 sites collecting data
- 224 participants taken part around the UK
- Target: 900 by December 2019

https://vision-in-parkinsons.co.uk

Rapsodi

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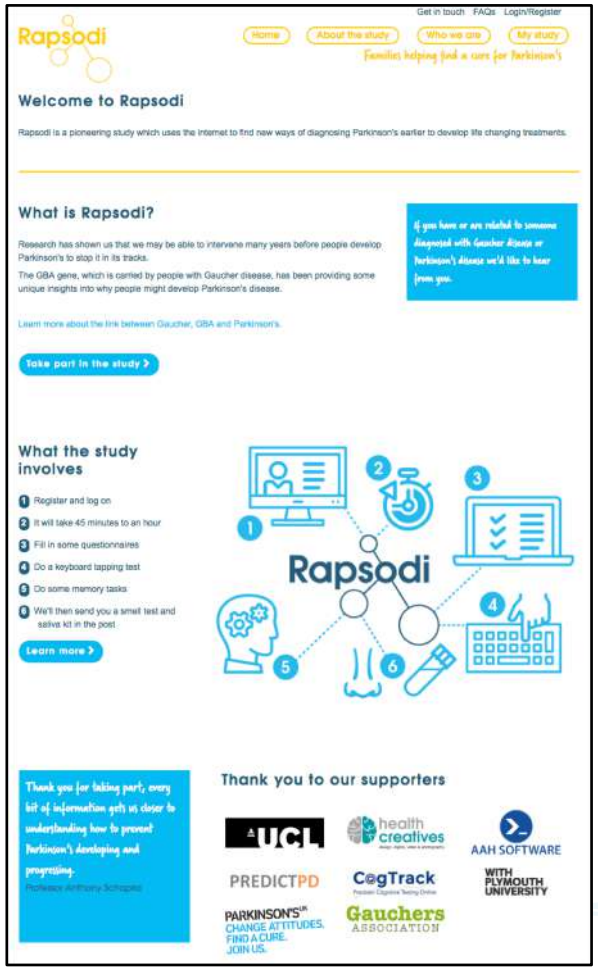
Remote assessment of Parkinsonism supporting ongoing development of intervention (Rapsodi)



- Longitudinal cohort study of glucocerebrosidase mutations (GBA) carriers without Parkinson disease
- GBA carriers drawn primarily from the pedigree of GBA PD cases and those with Gaucher disease (homozygous GBA carriers)
- Yearly assessment of anxiety, mood, motor symptoms, smell, cognition with DNA collection
- All assessments online or by post

www.rapsodistudy.com

Slide provided by Stephen Mullin

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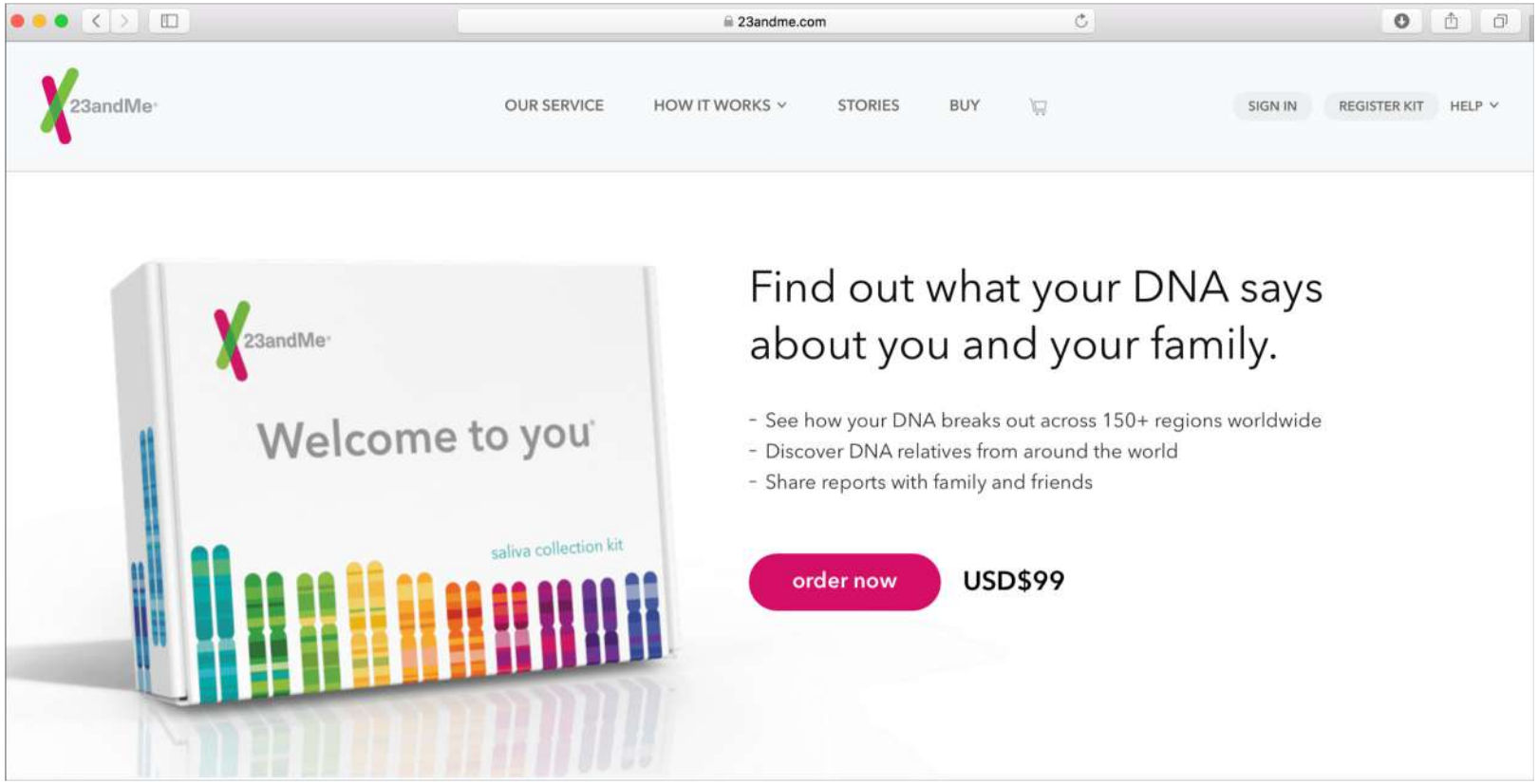

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Cross-sectional data

- ~13,500 cases
- >3 million controls
- 840 available phenotypes (via questionnaire)
- DNA on all

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Cold Spring Harbor Laboratory

bioRxiv

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New Results

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The Parkinson's Phenome: Traits Associated with Parkinson's Disease in a Large and Deeply Phenotyped Cohort

Karl Heilbron, Alastair Noyce, Pierre Fontanillas, Babak Alipanahi, The 23andMe Research Team, Mike Nalls, Paul Cannon

doi: https://doi.org/10.1101/270934

Posted February 28, 2018.

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Supplementary material

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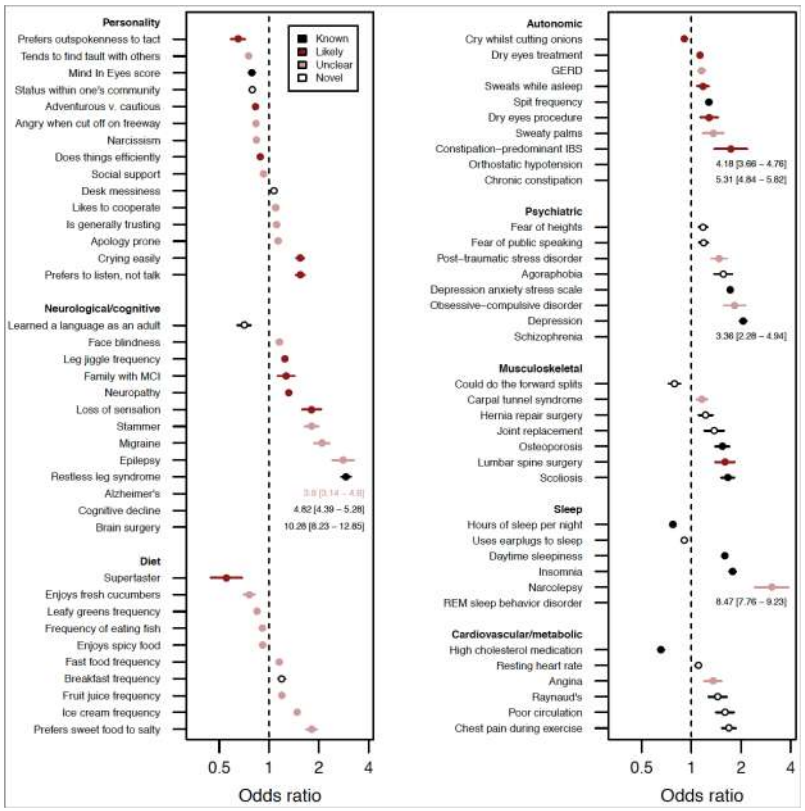

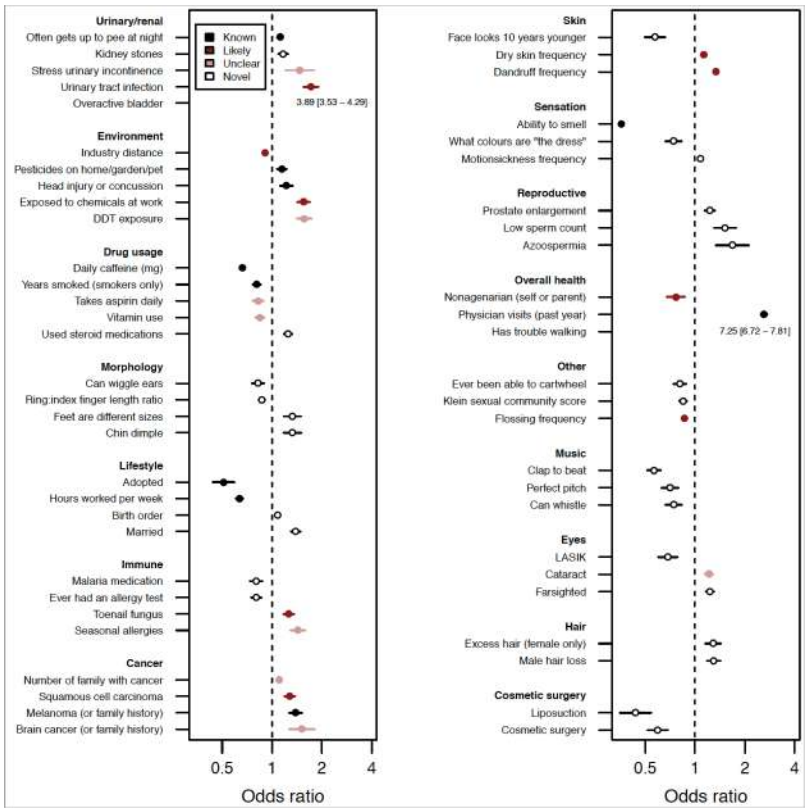

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FOX INSIGHT

YOUR EXPERIENCE FUELING RESEARCH

Barts and The London School of Medicine and Dentistry

To obtain comprehensive longitudinal data on over 100,000 individuals with PD in North America

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FOX INSIGHT
YOUR EXPERIENCE FUELING RESEARCH

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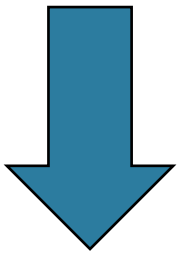
Assessments:

- Motor symptoms
- Non motor symptoms
- Physical function
- Mental health
- Medications
- Quality of life
- Unmet needs
- Health care preferences

>10,000 in November 2017



>25,000 in October 2018

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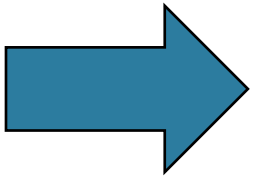

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Genetic testing at no cost

Other remote sample collection

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