

# Young onset Parkinson's disease

What is the difference?

Bart Post

Centre of expertise Parkinson's disease and rare movement disorders

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# Learning objectives

- Knowing why we have age cut-offs in approaching Parkinson's disease at a young age
  - Phenotype
  - Treatment
  - *Genetics*
- Knowing how to approach a patients (and his/her context) with young onset parkinson's disease
  - Personalized care for YOPD

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# Young onset Parkinson's disease

- Definition
- Epidemiology
- Juvenile parkinsonism
- Young onset Parkinson's disease

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# Early Onset Parkinson's Disease

- Juvenile parkinsonism
- YOPD
  - Phenotype
  - Therapy
  - *Genetics*
  - Care model
  - Research

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# 'EOPD'

- Early onset parkinsonism
  - <21 jr                      **juvenile parkinsonism**
  - 21-40 / 50 jr              **young-onset Parkinson's disease (YOPD)**
- Prevalence based on age
  - Schrag 2006              3-5%      <40 in USA
  - 10%      <40 in Japan
  - Wickremaratchi        5,4%      <50 in Cardiff
  - 31,2%    <65

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# Epidemiology

- Juvenile parkinsonism
  - No exact number, case based
- YOPD in the Netherlands
  - 5-10% <50 jaar
  - 28.000-50.000 patients with PD in the Netherlands
  - 1400-5000 YOPD in the Netherlands

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# Early Onset Parkinson's Disease

- **Juvenile parkinsonism**
- YOPD
  - Phenotype
  - Therapy
  - *Genetics*
  - Care model
  - Research

# Juveniel parkinsonisme: een praktische aanpak

JAARGANG 118 JUNI 2017 **2**

Juvenile parkinsonism: a practical approach

Mw. L. van den Heuvel<sup>1</sup>, dr. M.A.A.P. Willemsen<sup>2</sup>, mw. M. Schouten<sup>3</sup>, dr. B.P.C. van de Warrenburg<sup>4</sup>,  
dr. B. Post<sup>4</sup>



## REVIEW

## Clinical and neuroimaging phenotypes of genetic parkinsonism from infancy to adolescence

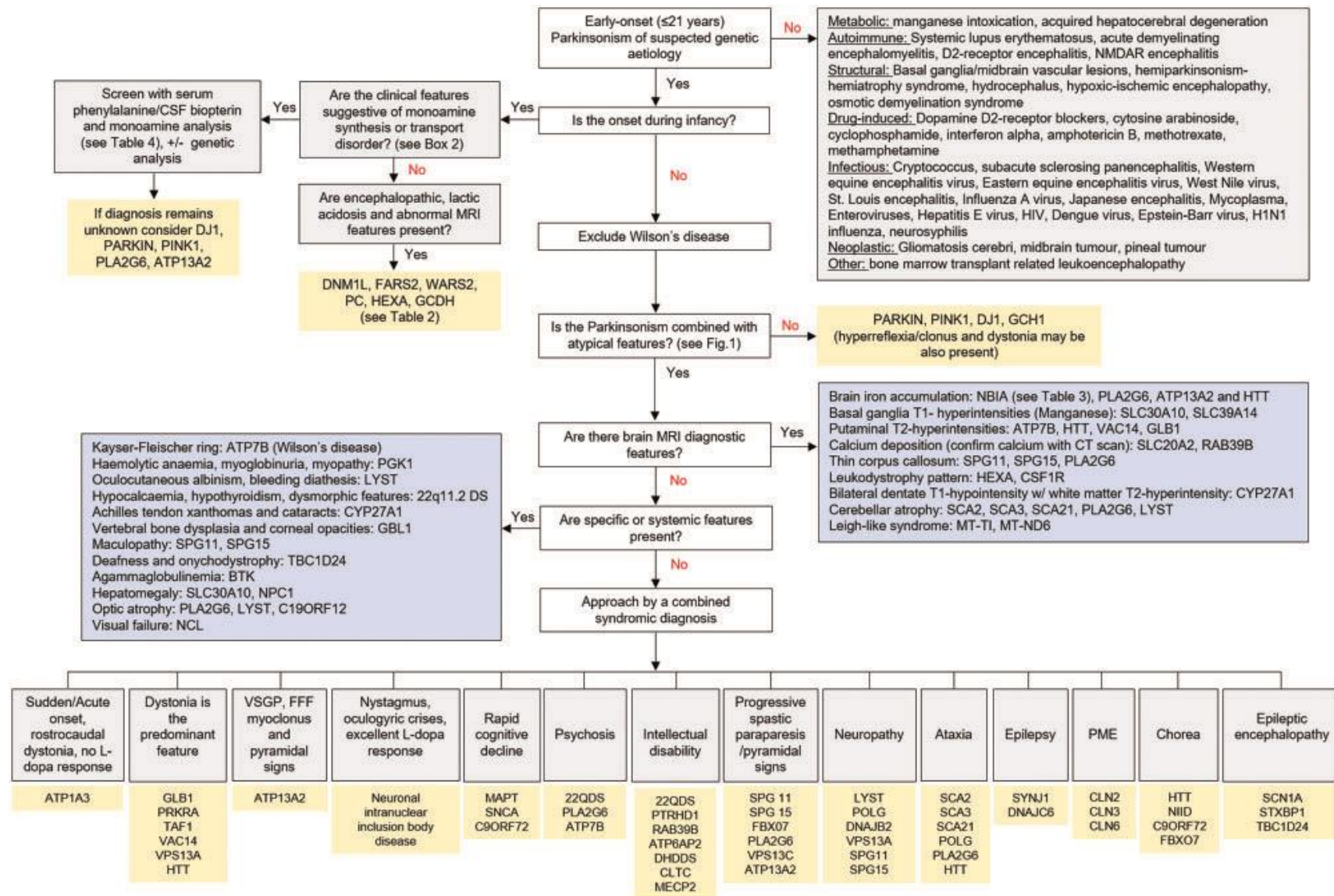
Hugo Morales-Briceño,<sup>1,2</sup> Shekeeb S. Mohammad,<sup>3</sup> Bart Post,<sup>4</sup> Alessandro F. Fois,<sup>1,2</sup>  
Russell C. Dale,<sup>3</sup> Michel Tchan<sup>2,5</sup> and Victor S.C. Fung<sup>1,2</sup>



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# Practical approach juvenile parkinsonism

- Could the parkinsonism be caused by medication?
  - Dopamin receptor blockers
- Are there any acquired causes for the parkinsonism?
  - Use MRI of the brain to find clues for an acquired cause
- Infectious or parainfectious cause likely?
  - Lumbar puncture; perform neurotransmitter analysis when you obtain CSF
- Three times **NO**, then use the approach we published in Brain 2019



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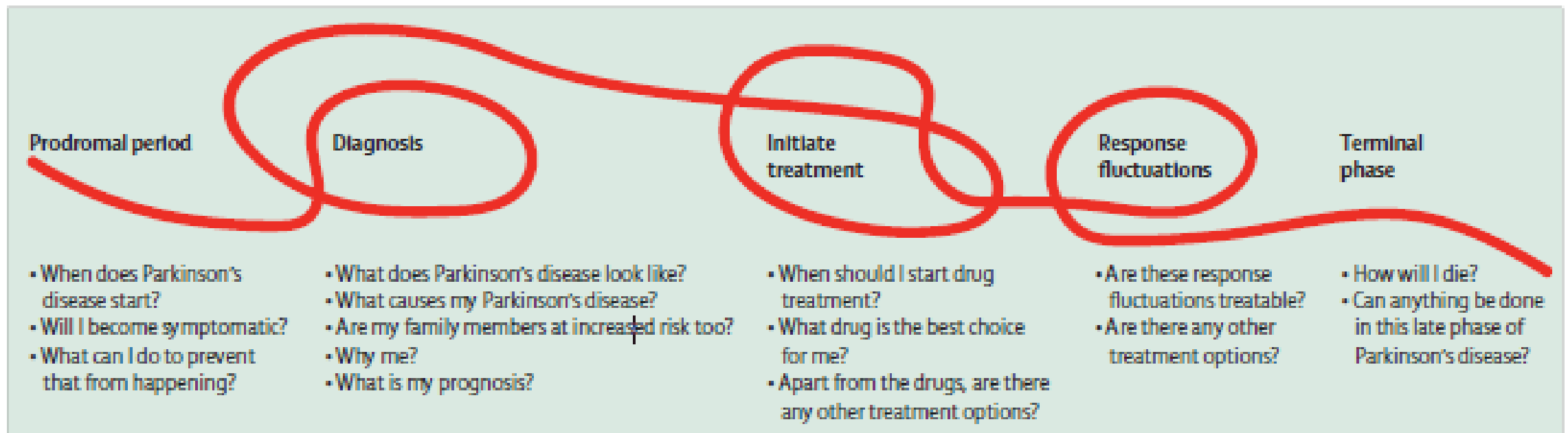
# Practical approach juvenile parkinsonism

- Treatable
  - DRD
  - Wilson's disease
- Genetic most common cause
  - PARKIN
- Genetic with great impact in the context of the patient
  - Huntington's disease

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# Early Onset Parkinson's Disease

- Juvenile parkinsonism
- **YOPD**
  - Phenotype
  - Therapy
  - *Genetics*
  - Care model
  - Research



Bloem. Lancet, 2021

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# Phenotype YOPD

- Does YOPD differ from LOPD?
- Literature
  - Small cohorts / case series
  - Retrospective
  - Expert opinion reviews
  - Almost no prospective cohort starting at age of diagnosis
- CORE-PD (USA) = Consortium On Risk of Early onset PD (<51jr)
  - N = 1136

# Phenotype YOPD

**TABLE 1.** Clinical and treatment characteristics of the study cohort by onset group

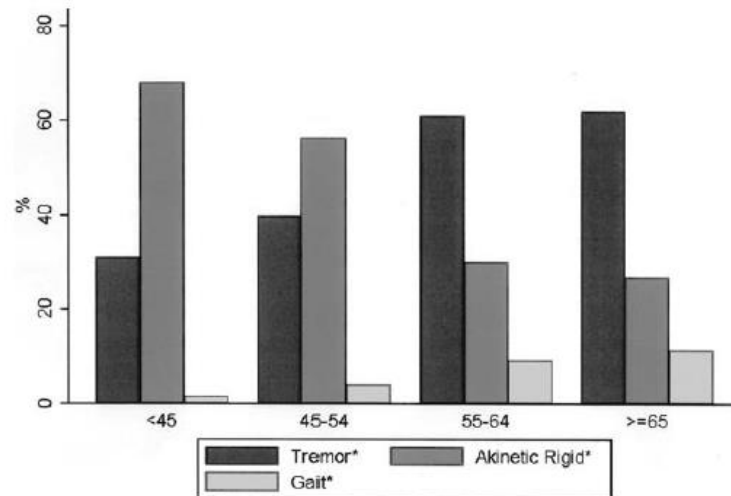
Onset group	All N = 358	<45 yr N = 70	45–54 yr N = 103	55–64 yr N = 88	≥ 65 yr N = 97	P-value*
Men:Women	1:0.6	1:0.7	1:0.6	1:0.6	1:0.6	0.945
Mean age at onset (range)	56 (8–85)	38 (8–44.9)	51 (45–54.9)	59 (55–64.9)	72 (65–85)	<0.0001
Mean current age (range)	65 (28–88)	51 (28–64)	61 (47–79)	67 (58–82)	77 (67–88)	<0.0001
Mean disease duration (range)	9 (1–39)	13 (1–39)	10 (1–28)	8 (1–24)	6 (1–27)	<0.0001
Mean motor UPDRS score (95% CI)	27 (26–28)	23 (21–26)	27 (24–29)	27 (24–30)	31 (29–33)	0.0013
L-DOPA treatment duration, yrs (range)	4.9 (0.2–26)	7.2 (0.20–20)	5.3 (0.02–26)	4.8 (0.02–22)	3.5 (0.03–12)	0.0024
L-DOPA treatment dose, mg (range)	428 (40–1450)	470 (50–1100)	473 (100–1450)	420 (100–1450)	363 (50–900)	0.0153

\*Chi-squared test for heterogeneity.

# Phenotype YOPD

**TABLE 2.** Presentations at onset in PD patients by onset group

Onset group	All n (%)	<45 yr n (%)	45–54 yr n (%)	55–64 yr n (%)	≥ 65 yr n (%)	P value	P value for trend
Presentation							
Tremor	175 (49)	21 (31)	41 (40)	53 (61)	66 (62)	<0.001	<0.0001
Akinetic-rigid	156 (44)	46 (68)	58 (56)	26 (30)	26 (27)	<0.001	<0.0001
Gait	24 (7)	1 (1)	4 (4)	8 (9)	11 (11)	0.04	0.004



**FIG. 1.** Prevalence of presenting symptom in each PD age at onset group [\*Significant *P*-value for trend and heterogeneity (*P*-values < 0.005 trend, each onset symptom)].

Wickremaratchi, jnp, 2011



# Phenotype YOPD

**TABLE 3.** Characteristics of dystonia by onset group

<i>Onset group</i>	<i>All n (%)</i>	<i>&lt;45 yr n (%)</i>	<i>45–54 yr n (%)</i>	<i>55–64 yr n (%)</i>	<i>≥ 65 yr n (%)</i>	<i>P value</i>	<i>P value for trend</i>
Presence of Dystonia	125 (39)	37 (59)	52 (58)	26 (30)	10 (12)	<0.001	<0.0001 <sup>a</sup>
Dystonia:							
At Onset	41 (12)	13 (20)	20 (20)	5 (6)	3 (3)	<0.001	<0.0001 <sup>a</sup>
In first 2 years	21 (6)	7 (11)	9 (10)	4 (5)	1 (1)	0.02	0.0025
Exercise induced	33 (9)	12 (18)	15 (15)	5 (6)	1 (1)	<0.001	<0.0001 <sup>a</sup>
Pre-treatment morning	2 (1)	1 (2)	0	0	1 (1)	0.47	0.87
Off period dystonia	44 (13)	19 (30)	21(20)	4 (5)	0	<0.001	<0.0001 <sup>a</sup>
Peak dose dystonia	15 (4)	7 (11)	4 (4)	2 (2)	2 (2)	0.03	0.0118 <sup>b</sup>
Treatment related	26 (8)	13 (21)	7 (7)	4 (5)	2 (2)	<0.001	0.0001
Non-dose related	34 (12)	4 (9)	19 (15)	14 (17)	6 (7)	0.22	0.65

Chi-squared tests for heterogeneity and trend.

<sup>a</sup><55 vs. ≥55 heterogeneity test *P* value (Dystonia < 0.001, At Onset < 0.001 Exercise induced < 0.001, Off-period < 0.0001).

<sup>b</sup><45 vs. ≥45 heterogeneity test *P* value (Peak dose = 0.004)

# Phenotype YOPD

Journal of Neurology  
<https://doi.org/10.1007/s00415-020-10266-y>

ORIGINAL COMMUNICATION



## Better quality of life and less caregiver strain in young-onset Parkinson’s disease: a multicentre retrospective cohort study

Maarten Te Groen<sup>1</sup> · Bastiaan R. Bloem<sup>1</sup> · Samuel S. Wu<sup>2</sup> · Bart Post<sup>1</sup> · The Parkinson’s Foundation Quality Improvement Initiative investigators

Received: 25 June 2020 / Revised: 6 October 2020 / Accepted: 7 October 2020  
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Clinical Review & Education

JAMA | Review

Diagnosis and Treatment of Parkinson Disease  
A Review

Melissa J. Armstrong, MD, MSc; Michael S. Okun, MD

JAMA. 2020;323(6):548-560.

Figure 2. Proposed Parkinson Disease Subtypes

Parkinson Disease Subtype and Estimated Frequency	Disease Presentation	Response of Motor Symptoms to Dopaminergic Medication	Disease Progression
Mild motor predominant 49%-53%	<ul style="list-style-type: none"><li>• Young at onset</li><li>• Mild motor symptoms</li></ul>	Good	Slow
Intermediate 35%-39%	<ul style="list-style-type: none"><li>• Intermediate age at onset</li><li>• Moderate motor symptoms</li><li>• Moderate nonmotor symptoms</li></ul>	Moderate to good	Moderate
Diffuse malignant 9%-16%	<ul style="list-style-type: none"><li>• Variable age at onset</li><li>• Rapid eye movement sleep behavior disorder</li><li>• Mild cognitive impairment</li><li>• Orthostatic hypotension</li><li>• Severe motor symptoms</li><li>• Early gait problems</li></ul>	Resistant	Rapid



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*The* NEW ENGLAND  
JOURNAL *of* MEDICINE

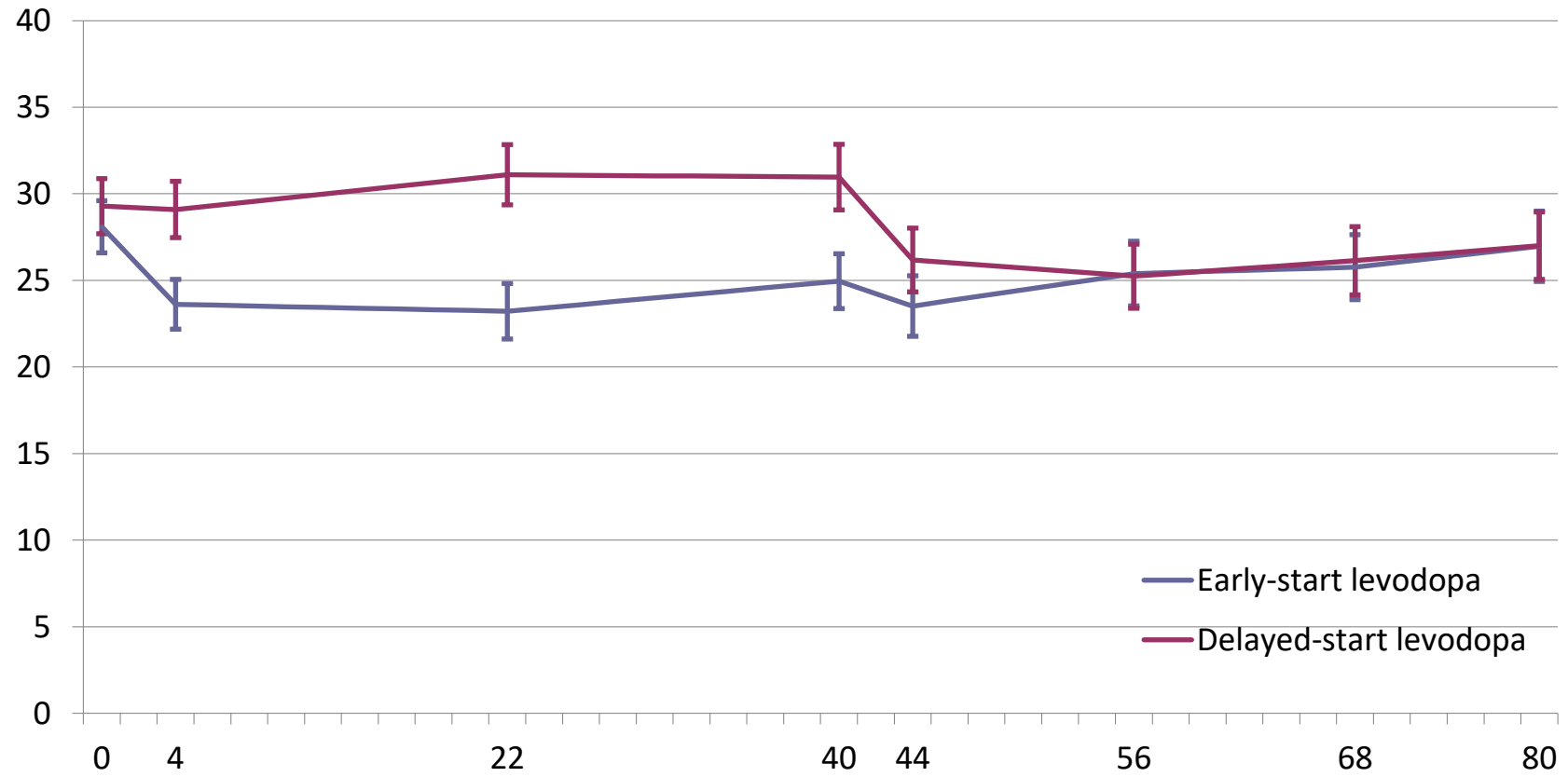
ESTABLISHED IN 1812

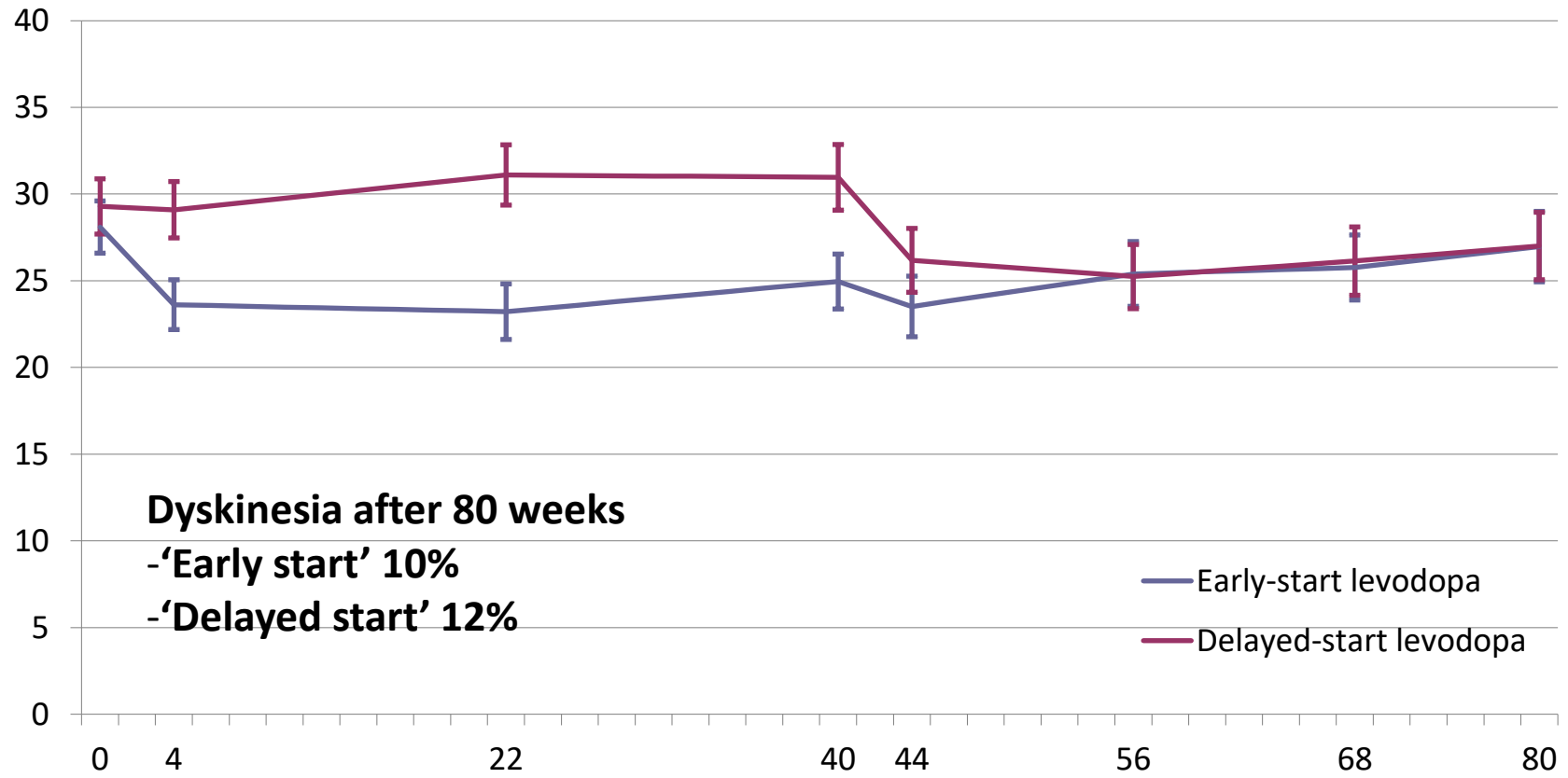
JANUARY 24, 2019

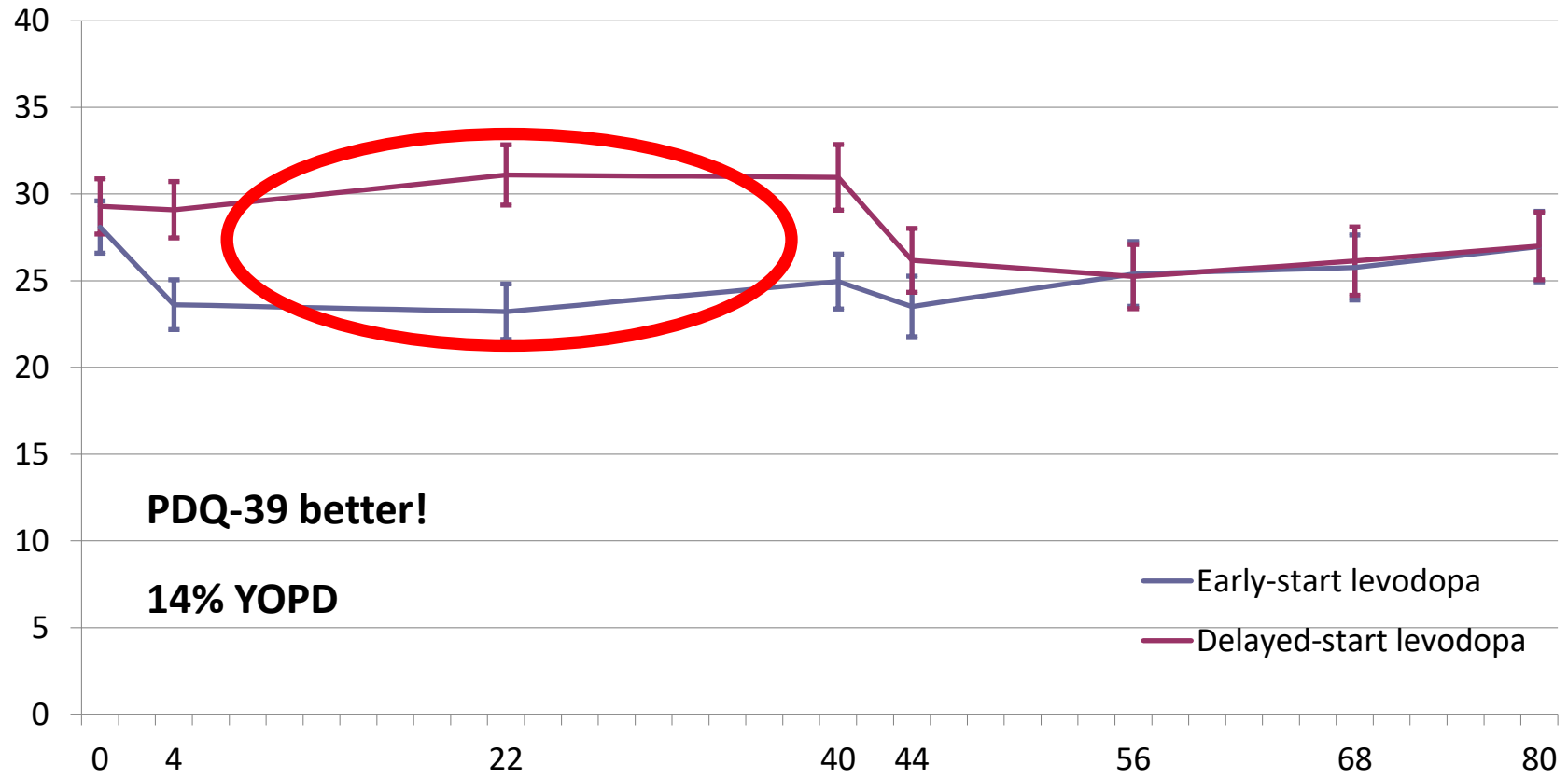
VOL. 380 NO. 4

Randomized Delayed-Start Trial of Levodopa  
in Parkinson's Disease

C.V.M. Verschuur, S.R. Suwijn, J.A. Boel, B. Post, B.R. Bloem, J.J. van Hilten, T. van Laar, G. Tissingh, A.G. Munts,  
G. Deuschl, A.E. Lang, M.G.W. Dijkgraaf, R.J. de Haan, and R.M.A. de Bie, for the LEAP Study Group\*







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# PD-MED

Long-term effectiveness of dopamine agonists and monoamine oxidase B inhibitors compared with levodopa as initial treatment for Parkinson's disease (PD MED): a large, open-label, pragmatic randomised trial

*PD MED Collaborative Group\**

www.thelancet.com Published online June 11, 2014 [http://dx.doi.org/10.1016/S0140-6736\(14\)60683-8](http://dx.doi.org/10.1016/S0140-6736(14)60683-8)



# PD-MED

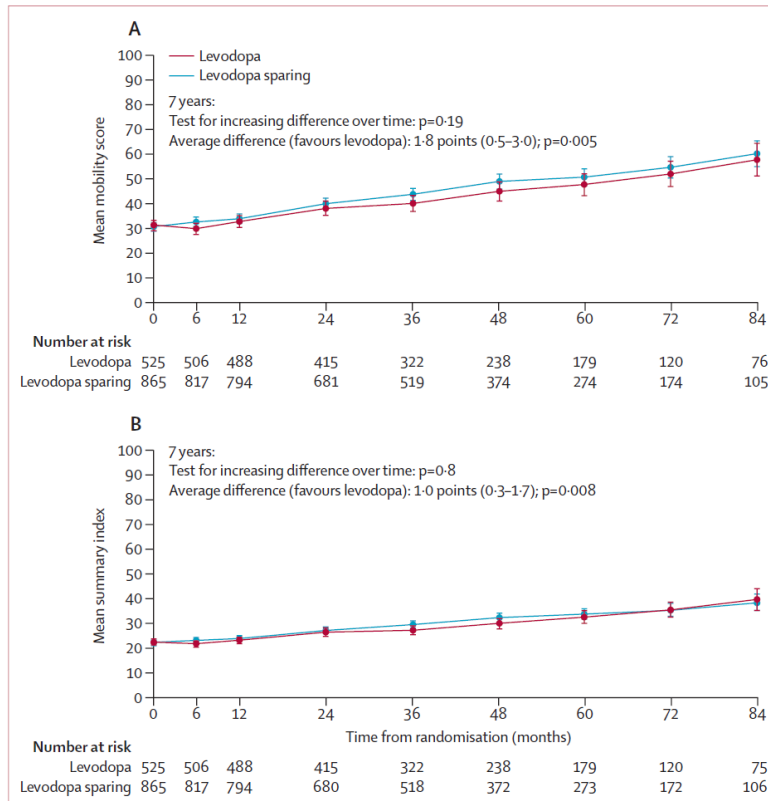


Figure 4: 39-item patient-rated Parkinson's disease questionnaire mobility score (A) and summary index (B) with time in levodopa and levodopa-sparing groups

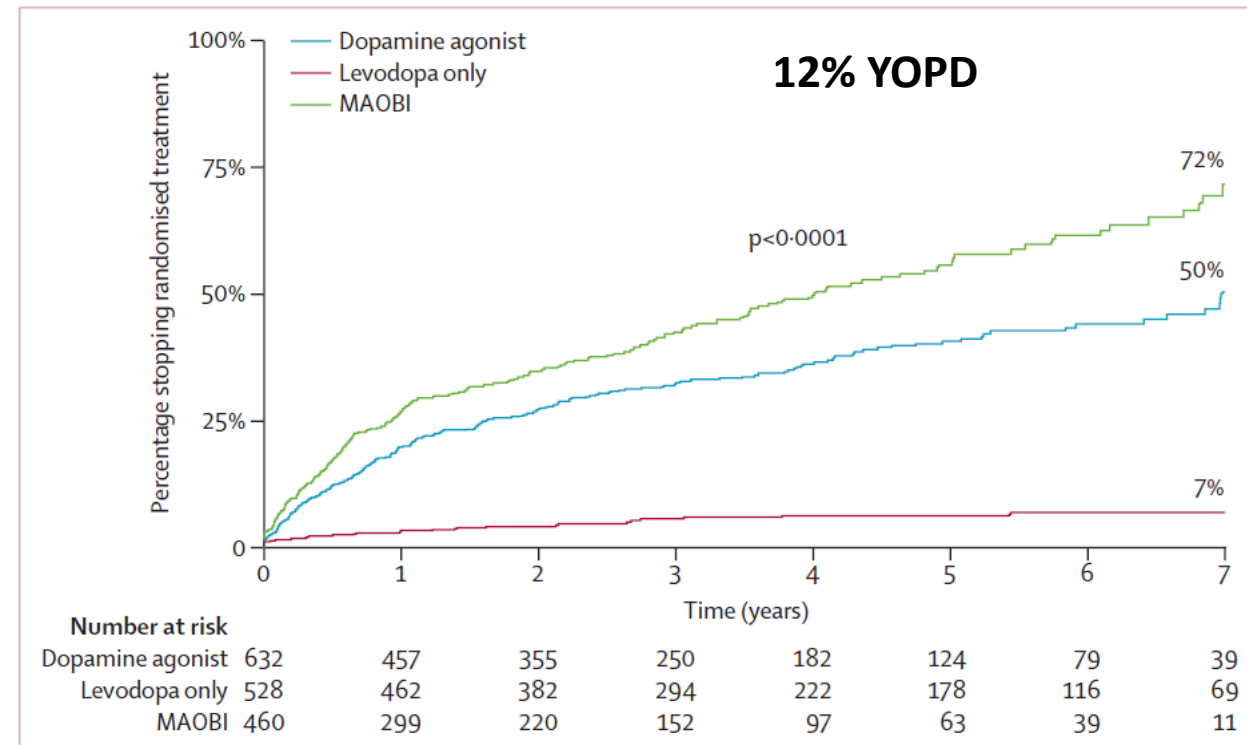


Figure 2: Proportion of patients stopping treatment with allocated drug class  
MAOBI=monoamine oxidase type B inhibitors.

# PD-MED

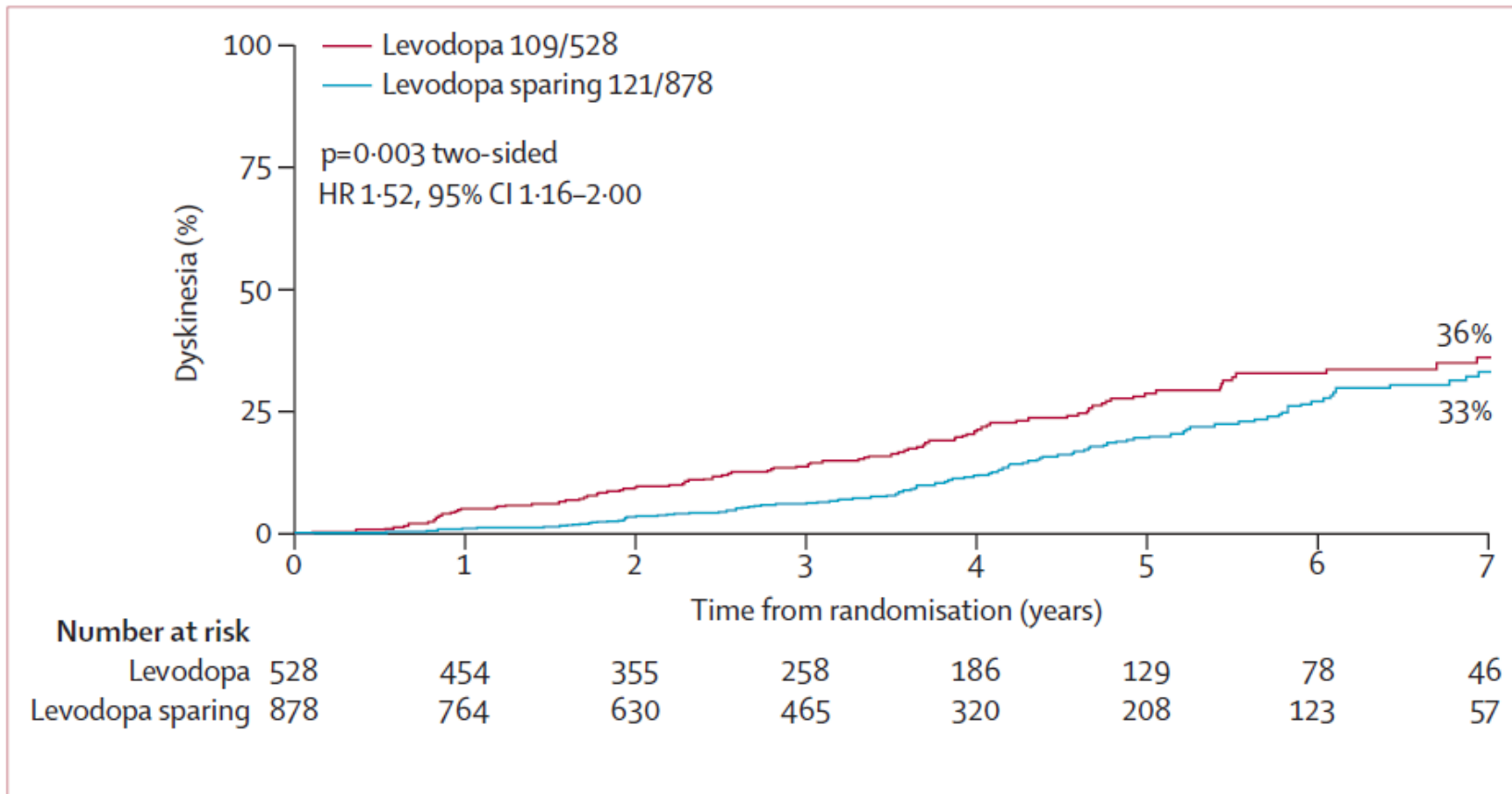
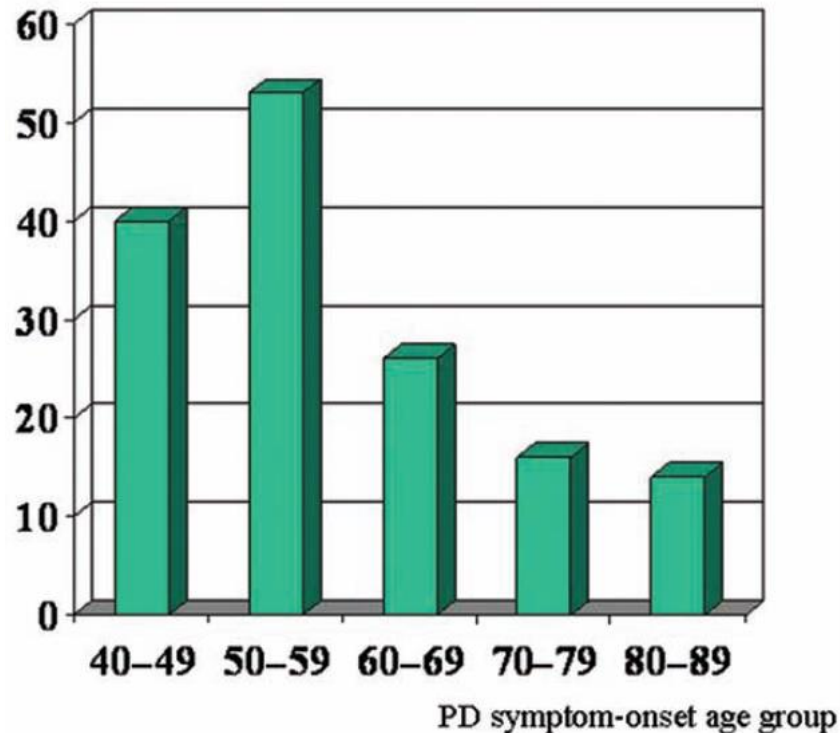


Figure 5: Risk of developing dyskinesia in levodopa and levodopa-sparing groups

# Levodopa



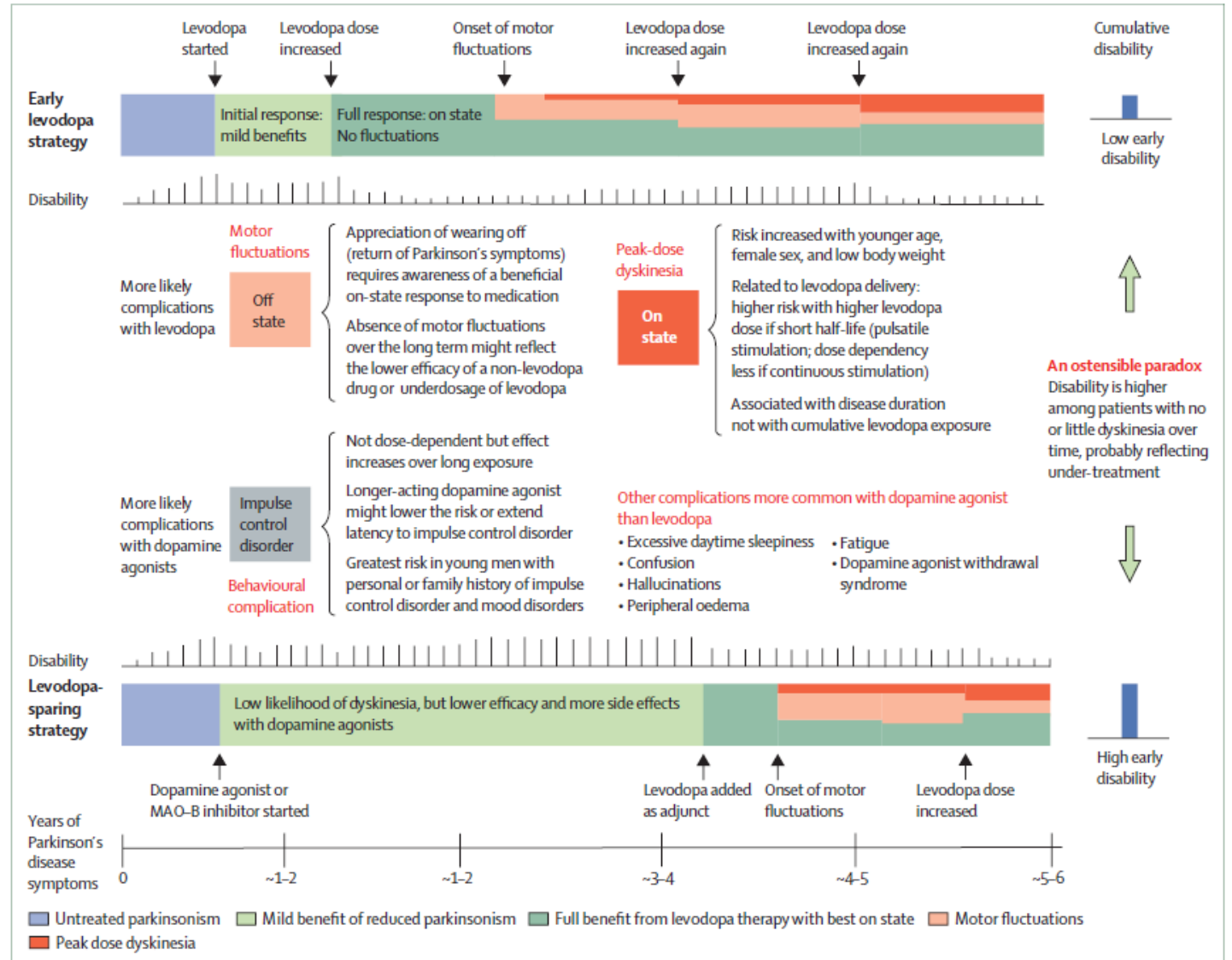
Vlaar, PN, 2011 ; based on data Kumar 2005

- We are afraid of dyskinesia
- Dyskinesia after 5 Year (Kumar in 2005)
  - 40-60 40-50%
  - 60-69 26%
  - 70-79 16%
- Series of EOPD dyskinesia 100% after 5 year.
- Study with 10 year follow-up only 12% of all pt with dyskinesia (>90%) can't be treated with adjustment of medication!!!!!!!!!!

## Initiation of pharmacological therapy in Parkinson's disease: when, why, and how

Rob M A de Bie, Carl E Clarke, Alberto J Espay, Susan H Fox, Anthony E Lang

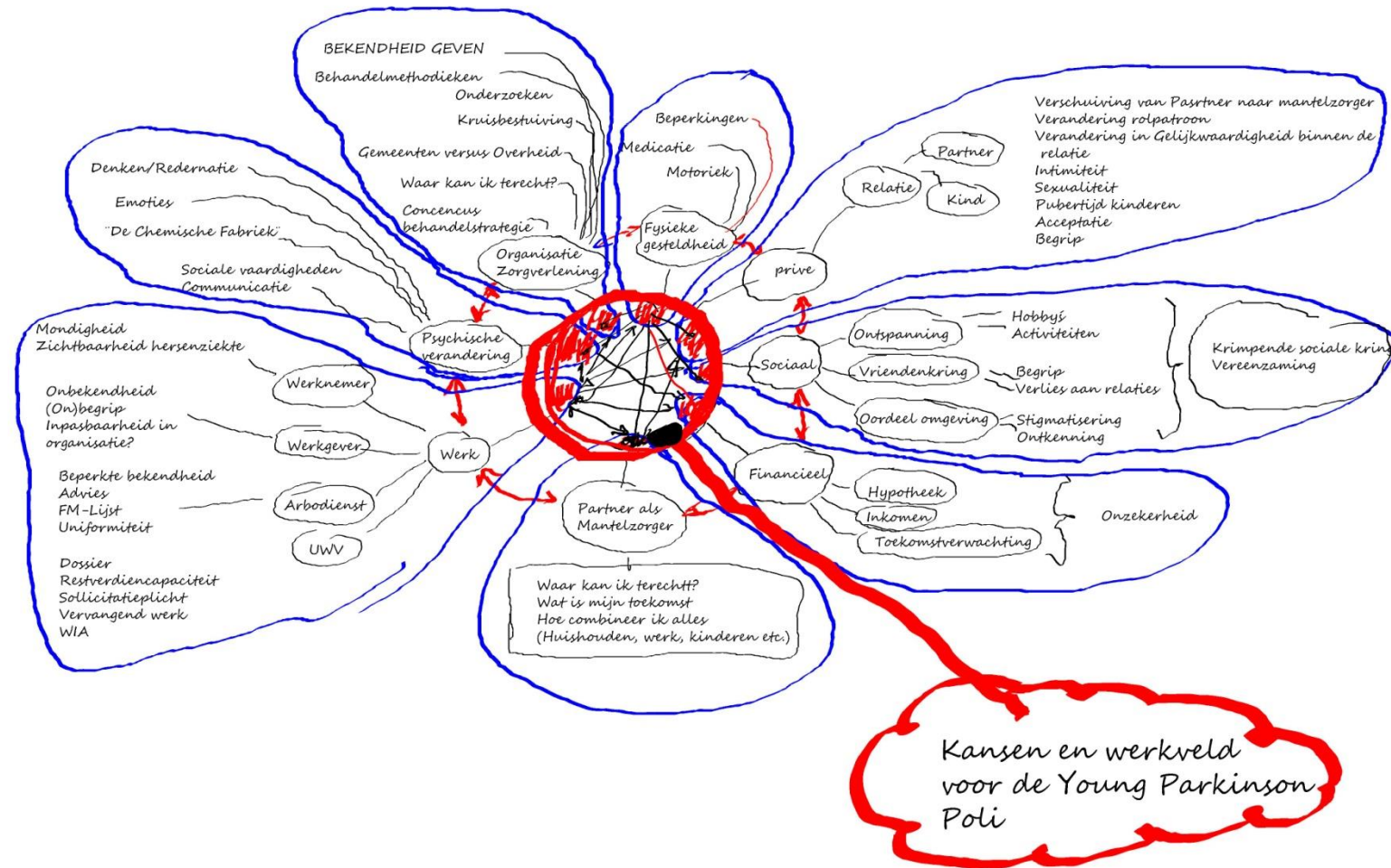
Lancet Neurology, 2020





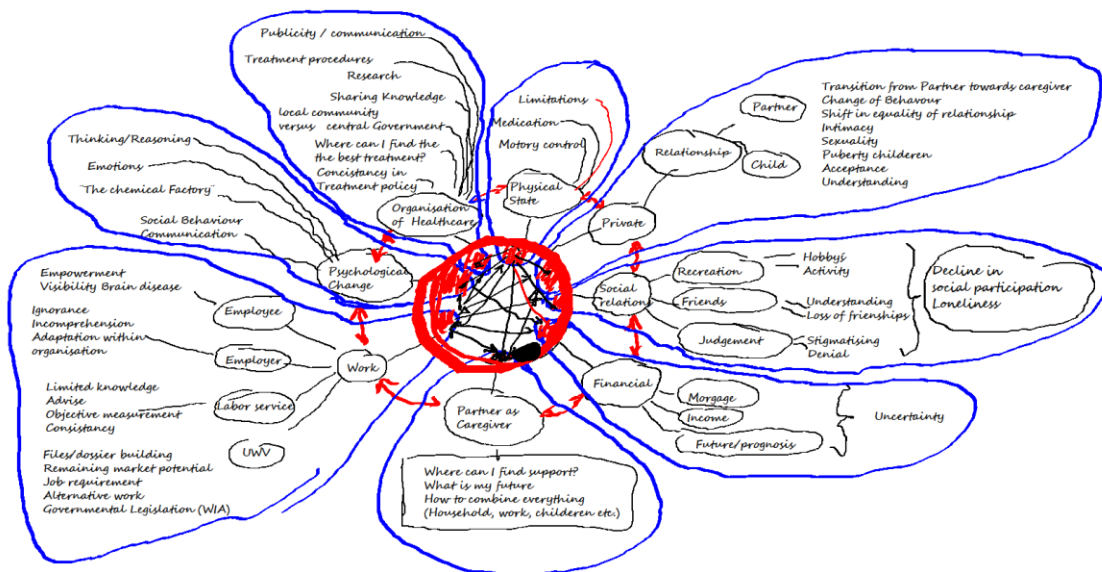
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# Caring for YOPD patients and there context



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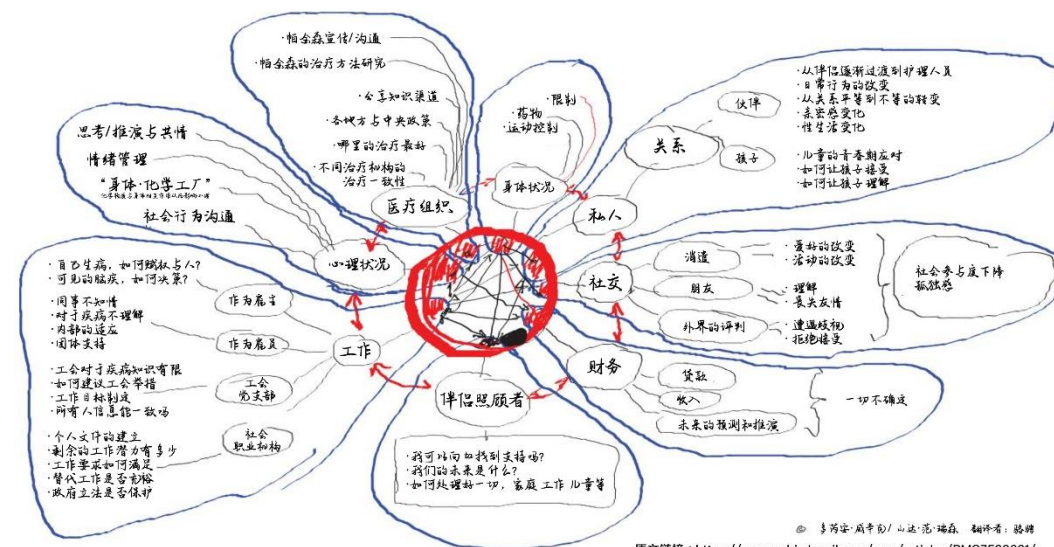


© Dorien Wissink / Xander van Ruissen

## 青年型帕金森患者所面临的挑战

病情是突如其来的，年轻患者需要整理好自己的心态，面对接踵而来的事宜。

规划好自己的人生，以获得更好的生活质量。以下思维导图包含事项供参考。



© 多丽丝·威辛克 / 山达·范·瑞森 翻译者: 路路

原文链接: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7592661/>



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# Specific issues YOPD

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REVIEW

CME

## Movement Disorders in Women: A Review

Marcie L. Rabin, MD, Claire Stevens-Haas, Emilyrose Havrilla, Tanvi Devi, BS, and Roger Kurlan, MD\*

*Atlantic Neuroscience Institute, Overlook Medical Center, Summit, New Jersey*

*Movement Disorders*, Vol. 29, No. 2, 2014

**177**

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## GAPS & CONTROVERSIES

# Unmet Needs of Women Living with Parkinson's Disease: Gaps and Controversies

Indu Subramanian, MD,<sup>1,2\*</sup>  Soania Mathur, MD,<sup>3</sup> Annelien Oosterbaan, MD, PhD,<sup>4</sup> Richelle Flanagan, RD,<sup>5</sup>  
Adrienne M. Keener, MD,<sup>1,2</sup>  and Elena Moro, MD, PhD<sup>6</sup> 

<sup>1</sup>Department of Neurology, David Geffen School of Medicine, University of California Los Angeles, Los Angeles, California, USA

<sup>2</sup>Parkinson's Disease Research, Education, and Clinical Center, Greater Los Angeles Veterans Affairs Medical Center, Los Angeles, California, USA

<sup>3</sup>Unshakeable MD, Toronto, Ontario, Canada

<sup>4</sup>Department of Neurology, Radboud University Medical Center, Nijmegen, The Netherlands

<sup>5</sup>Be NutritionWise, Dublin, Ireland

<sup>6</sup>Grenoble Alpes University, Faculty of Medicine, Division of Neurology, CHUGA, Grenoble Institute of Neurosciences, Grenoble, France

Movement disorders, 2022

# Specific issues YOPD

*Movement Disorders*  
Vol. 25, No. 6, 2010, pp. 665–671  
© 2010 Movement Disorder Society

CME

Review

## Movement Disorders and Pregnancy: A Review of the Literature

Sarah M. Kranick, MD,<sup>1\*</sup> Ellen M. Mowry, MD,<sup>2</sup> Amy Colcher, MD,<sup>1</sup> Stacy Horn, DO,<sup>1</sup>  
and Lawrence I. Golbe, MD<sup>3</sup>

<sup>1</sup>*Department of Neurology, University of Pennsylvania, Philadelphia, Pennsylvania, USA*

<sup>2</sup>*Department of Neurology, University of California, San Francisco, California, USA*

<sup>3</sup>*Department of Neurology, University of Medicine and Dentistry of New Jersey-Robert Wood  
Johnson Medical School, New Brunswick, New Jersey, USA*

TNN NEUROLOGIE

97

## Zwangerschap bij de ziekte van Parkinson

Pregnancy and Parkinson's disease

J.A. Hebbink MSc<sup>1</sup>, C. Bethlehem MSc<sup>2</sup>, dr. B. Post<sup>3</sup>

Hebbink, TNN, 2020

*Movement  
Disorders*

RESEARCH ARTICLE

CLINICAL PRACTICE

## Management of Parkinson's Disease During Pregnancy: Literature Review and Multidisciplinary Input

Caitlin Young, MD,<sup>1\*</sup> Rhiannon Phillips, PhD,<sup>2</sup> Louise Ebenezer, MSc,<sup>3</sup> Rodi Zutt, MD, PhD,<sup>4</sup> and Kathryn J. Peall, MD, PhD<sup>5\*</sup>

Young, MDCP, 2020

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# Specific issues YOPD

PD and pregnancy

- PD symptoms worse
- Only case reports and retrospective studies
- Medication

- Willanka Kapelle

PhD Radboudumc YOPD

The major medications used in the treatment of PD are outlined in Supporting Information Table. In summary, most of the medications used for PD are considered pregnancy class C due to the lack of human or animal evidence regarding their impact on fetal development. With that caveat, there are two or more successful reports of treatment of pregnant women with PD using L-dopa, carbidopa, benserazide, pergolide, pramipexole, cabergoline, selegiline, and trihexiphenidyl. One or no case reports exist regarding the use in pregnancy of entacapone, tolcapone, bromocriptine (in typical PD doses), ropinirole, rasagiline, or benztropine. The summary of evidence regarding amantadine suggests that this, more than any other PD medication, should be avoided during pregnancy.

# Specific issues YOPD



Disability and Rehabilitation

ISSN: 0963-8288 (Print) 1464-5165 (Online) Journal homepage: <http://www.tandfonline.com/loi/idre20>



A study investigating the experience of working for people with Parkinson's and the factors that influence workplace success

Rebecca L. Mullin, K. Ray Chaudhuri, Thomasin C. Andrews, Anne Martin, Stella Gay & Claire M. White

Shrag, 2006

Time to loss employment

- Median 6 yrs
- 46% after 5 yrs
- 82% after 10 yrs



## Review

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# Young Onset Parkinson's Disease: A Modern and Tailored Approach

Bart Post<sup>a,\*</sup>, Lieneke van den Heuvel<sup>a</sup>, Teije van Prooijs<sup>a</sup>, Xander van Ruissen<sup>a</sup>,  
Bart van de Warrenburg<sup>a</sup> and Jorik Nonnekes<sup>b,c</sup>

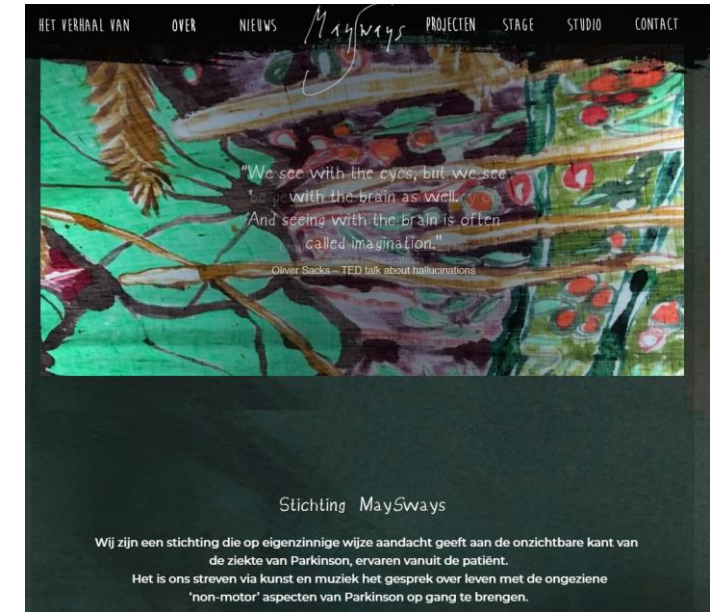
<sup>a</sup>*Department of Neurology, Radboud University Medical Center, Donders Institute for Brain, Cognition and Behaviour, Center of Expertise for Parkinson and Movement Disorders, Nijmegen, The Netherlands*

<sup>b</sup>*Department of Rehabilitation, Radboud University Medical Center, Donders Institute for Brain, Cognition and Behaviour, Center of Expertise for Parkinson and Movement Disorders Nijmegen, The Netherlands*

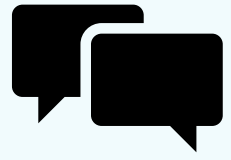
<sup>c</sup>*Department of Rehabilitation, Sint Maartenskliniek, Nijmegen, The Netherlands*

# PhD project YOPD

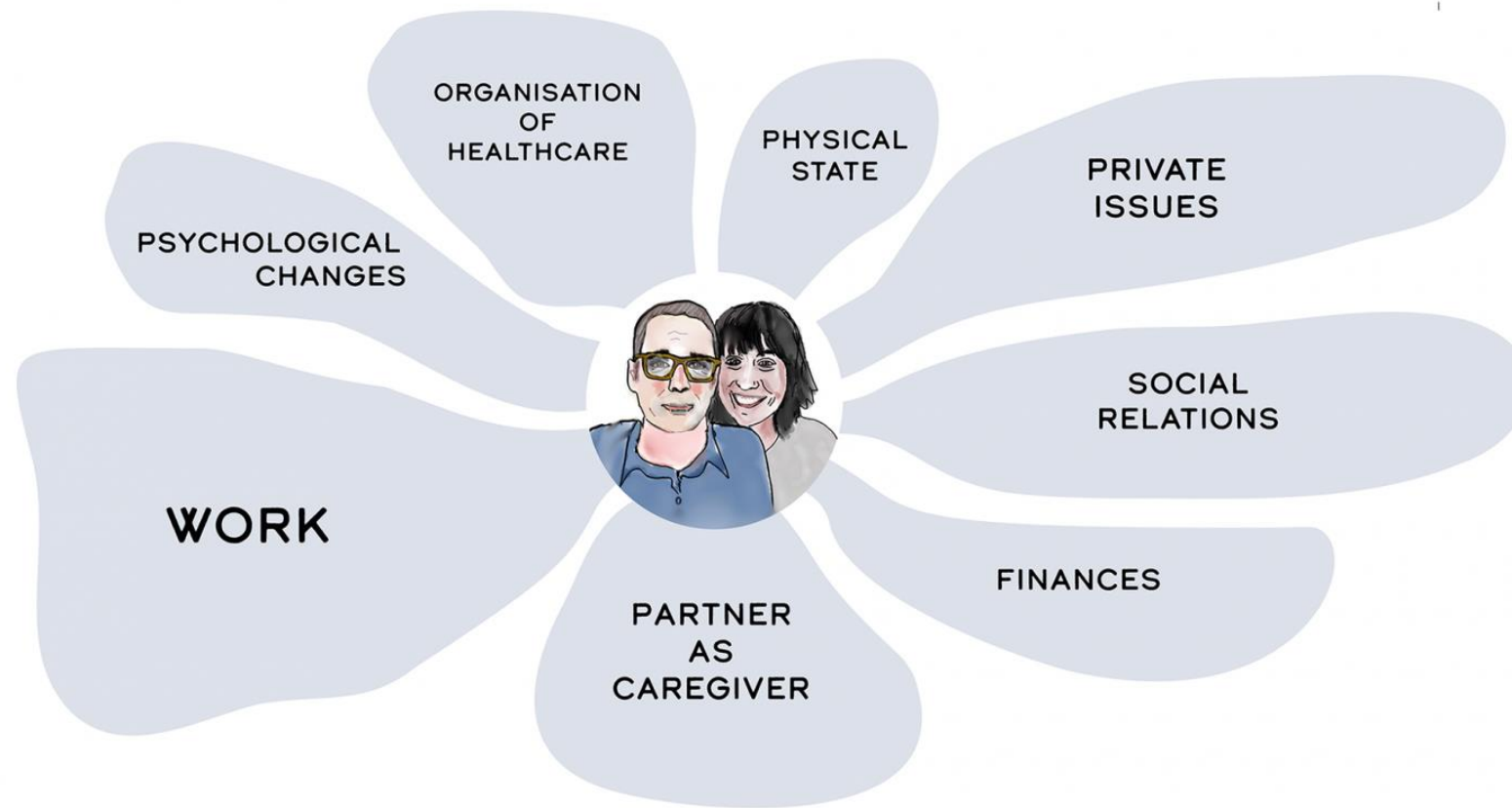
- Grant 'stichting MaysWays'
  - Interview study YOPD
- Creating a Young Onset Parkinson's disease Expertise Centre
  - Together with patient; evaluating cocreation
- Specific projects
  - Work and YOPD
  - Women and YOPD

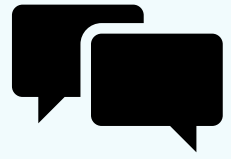






# Interview studies: the impact of living with YOPD





# Interview studies: the impact of living with YOPD

**Aim:** to explore the invisible burden of living with YOPD

**Question:** What are the experiences of people with YOPD regarding topics in the mind map?

**Methods:** in-depth interviews among 50 people with YOPD

**Primary analysis:** 3 topics

- Social context
- Work
- Feedback on current support and health care

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## Tweet Bas Bloem

‘Patients do not know best,  
they know different.  
Together we know best.’



# Evaluation of co-creation

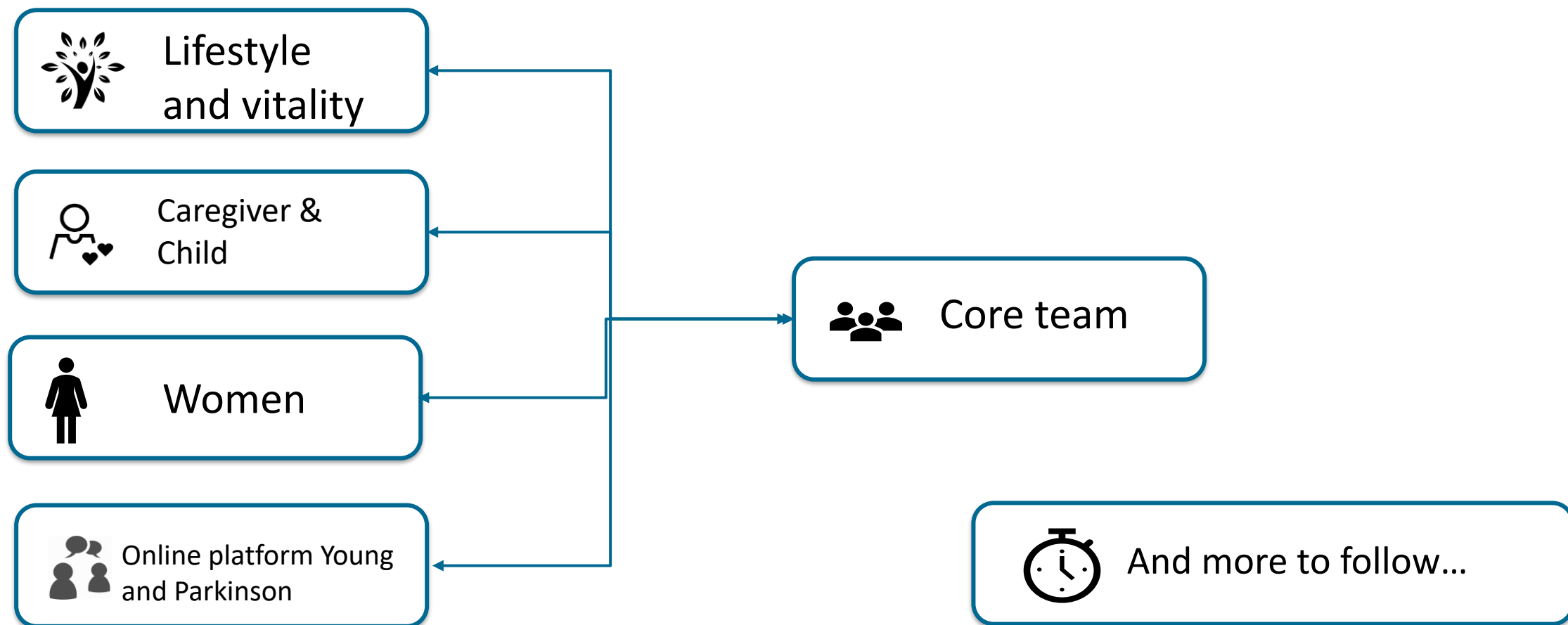
## Co-creation

*The development, design and/or implementation of services or products in **equal collaboration** & with **mutual respect** between all parties involved: **people with Parkinson's disease, informal and professional caregivers, etc.***





# YOPEC: structure





# YOPEC: an example



## Goal

Online platform Young and Parkinson: Website for people with YOPD and their caregivers



## Participants

- ✓ People with YOPD, caregivers, health care professionals, Dutch Parkinson Association
- ✓ Using each others expertise



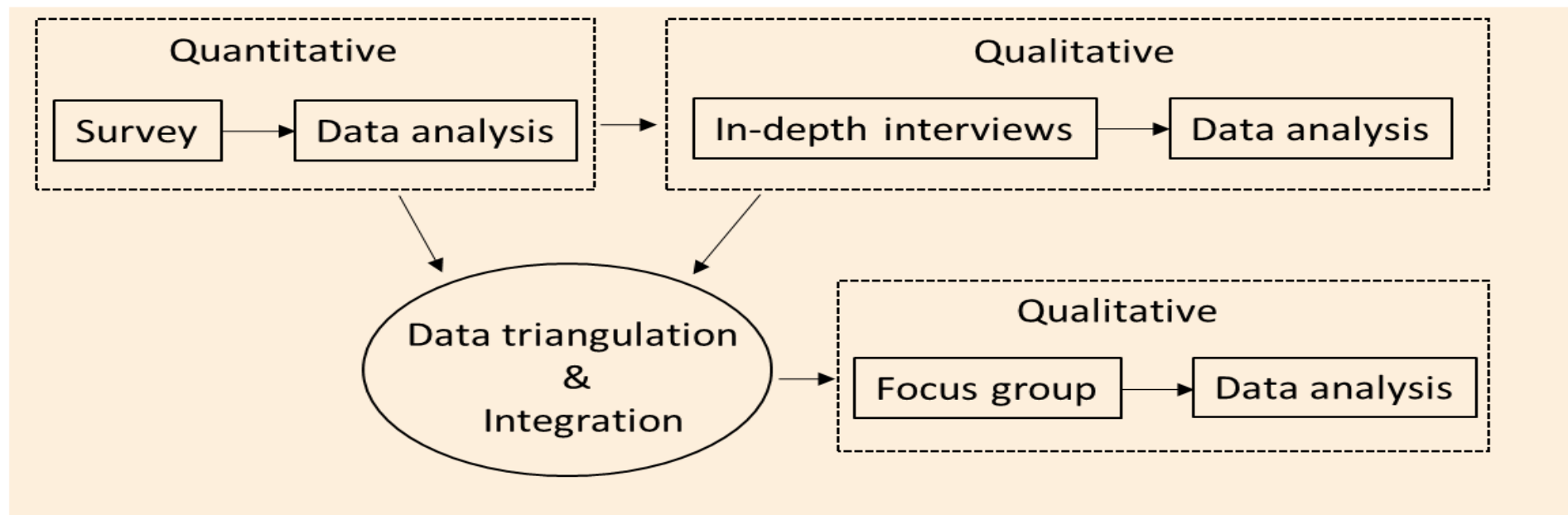
## Meetings

- ✓ Monthly
- ✓ No traditional chair
- ✓ Each voice is equally important
- ✓ Common work space in Teams



# Evaluation of co-creation

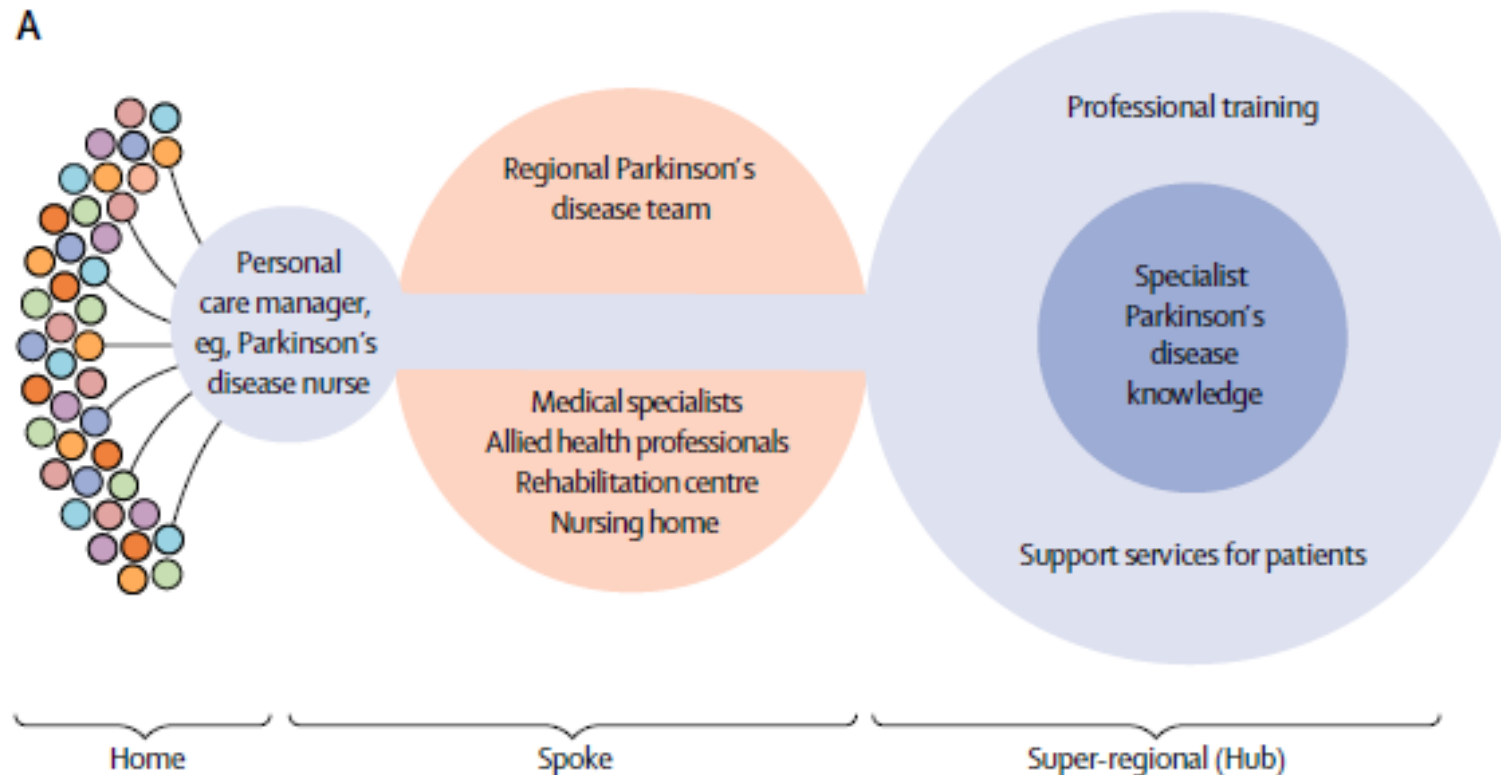
## *Sequential mixed methods research approach*



QUAL

*Continuous field research through co-creation practices*

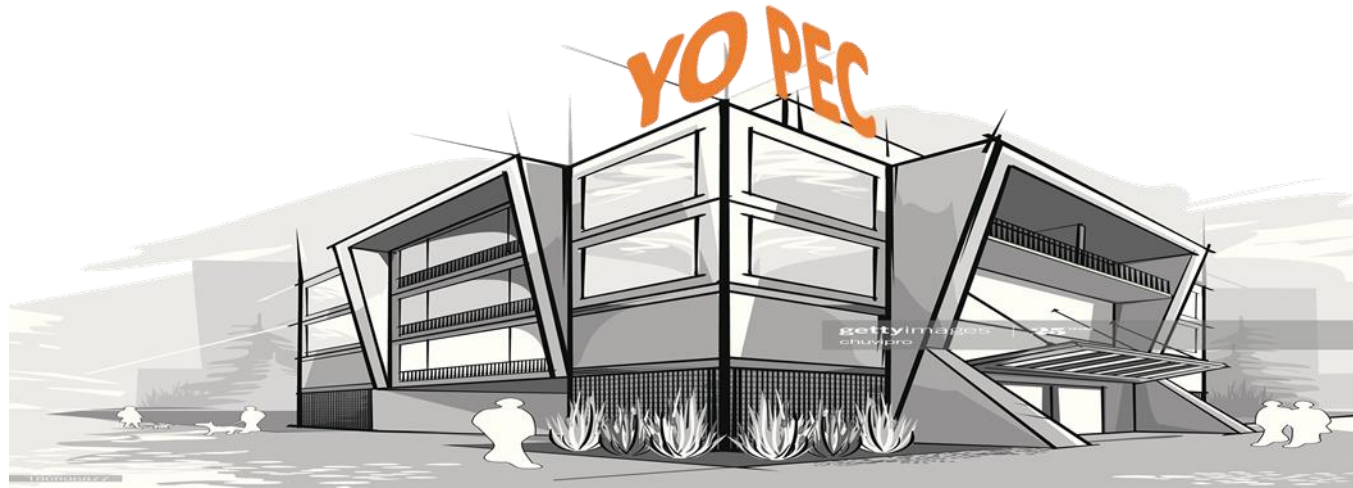
# Young Onset Parkinson's disease Expertise Centre





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# Young Onset Parkinson's disease Expertise Centre





# YOPEC management team



Mark Douwma  
Living with YOPD



Chyntia Geutjes  
PD nurse



Alexander van  
der Graaff  
Caregiver  
father with PD



Willanka Kapelle  
PhD  
YOPD



Annelien  
Oosterbaan  
Living with YOPD  
Gynaecologist



Bart Post  
Neurologist



Xander van  
Ruissen  
Living with YOPD



Lousanne  
Tangelder  
Physiotherapist  
coach



# Young Onset Parkinson Expertise Centre

Experience  
personalized care

## Young Onset Parkinson's Disease: A Modern and Tailored Approach

Bart Post<sup>a,\*</sup>, Lienneke van den Heuvel<sup>a</sup>, Teije van Prooije<sup>a</sup>, Xander van Ruissen<sup>a</sup>,  
Bart van de Warrenburg<sup>a</sup> and Jorik Nonnekes<sup>b,c</sup>  
<sup>a</sup>Department of Neurology, Radboud University Medical Center, Donders Institute for Brain, Cognition and Behaviour, Center of Expertise for Parkinson and Movement Disorders, Nijmegen, The Netherlands  
<sup>b</sup>Department of Rehabilitation, Radboud University Medical Center, Donders Institute for Brain, Cognition and Behaviour, Center of Expertise for Parkinson and Movement Disorders Nijmegen, The Netherlands  
<sup>c</sup>Department of Rehabilitation, Sint Maartenskliniek, Nijmegen, The Netherlands

- Knowledge
  - Specific knowledge YOPD
- Services
  - Dystonia and YOPD (rehabilitation department)
  - Genetics and YOPD (genetic department)
  - Work and YOPD (rehabilitation en occupational health deartment)
  - *Women and YOPD (gynaecology department)*
    - ***PRE***gnancy and ***PA***rkinson's disease ***I***nternational ***R***egistry
- Cocreating care for YOPD
  - IQ-healthcare / Erasmus School of Health Policy and Management
- Partner of Mayo Clinic Rochester, prof. dr. Rodolfo Savica



Tom Isaacs: “This is a time  
of cautious hope instead of  
conservative paternalism”

