



Parkinson's disease

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Learning objectives

- An understanding of the complex neuro-degenerative disease Parkinson's.
- Learn about best practice medication management for people living with Parkinson's.
- Assessment and strategies for managing non-motor Symptoms of Parkinson's.

People with Parkinson's disease



Prevalence

- Survey estimate between 150,000 - 219,000 people living with Parkinson's in Australia (incidence of 0.85%) – 69,600 in NSW (Mellick 2024) (Ayton et al, 2018)
- This number is projected to double in Australia to 436,000 by 2040 (Dorsey et al, 2018)
- World Health Organisation (WHO) Disability and death due to PD are increasing faster than for any other neurological disorder. (WHO, June 2022)

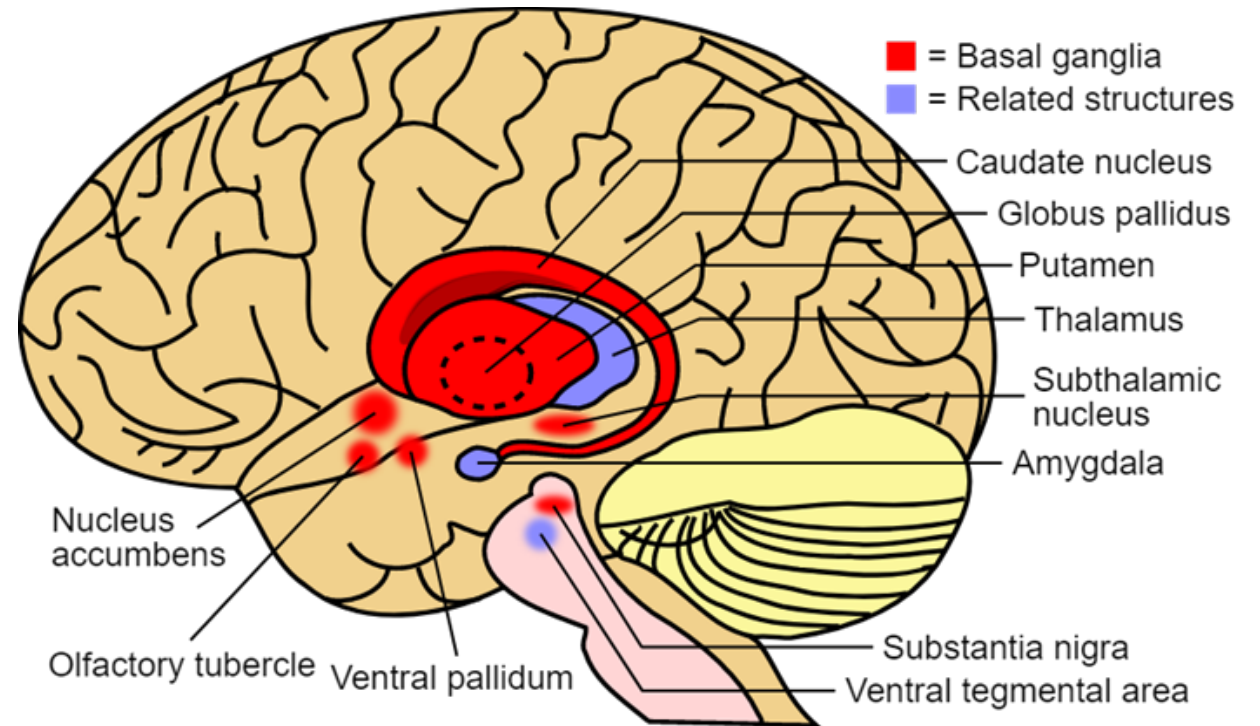


Parkinson's disease

- Early-onset Parkinson's disease (formerly known as Young-Onset PD)
- Starts < 50 years (5-10%)
- Familial/ Genetic / Monogenic – SNCA, LRRK and PINK1
- Sporadic/ Idiopathic /Complex (90- 95%)
- Causes not known – but interplay of genetic and environmental
- Age is a risk factor
- 60- 65 years 1:1000 and 75 years 1:100

What is Parkinson's disease ?

- is a ***progressive, slow, insidious*** neurodegenerative disease
- loss of dopaminergic cells (neuroinflammatory response)
- 60-80 % cells are lost before visiting the GP
 - striatum substantia nigra,
 - basal ganglia,

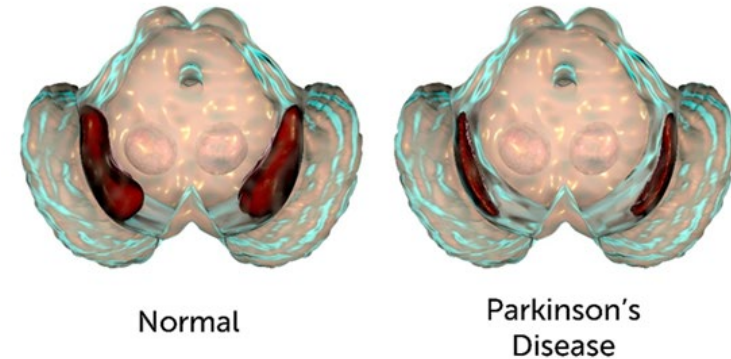


What is dopamine?

- Dopamine is a neurotransmitter needed for

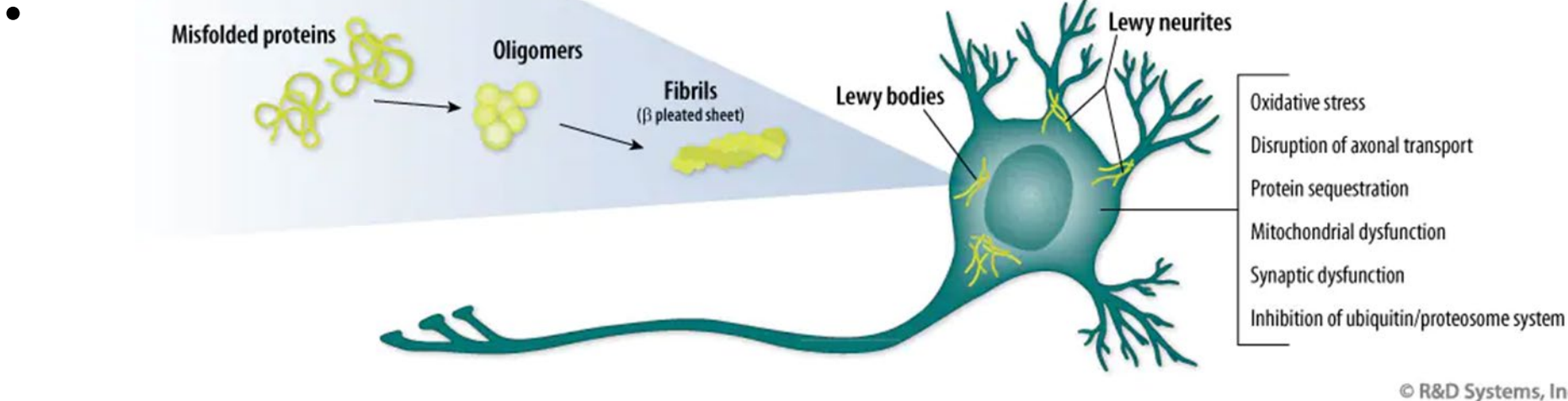
- voluntary movement
- reward (motivation)
- pleasure, euphoria
- Hugging releases dopamine

Substantia Nigra

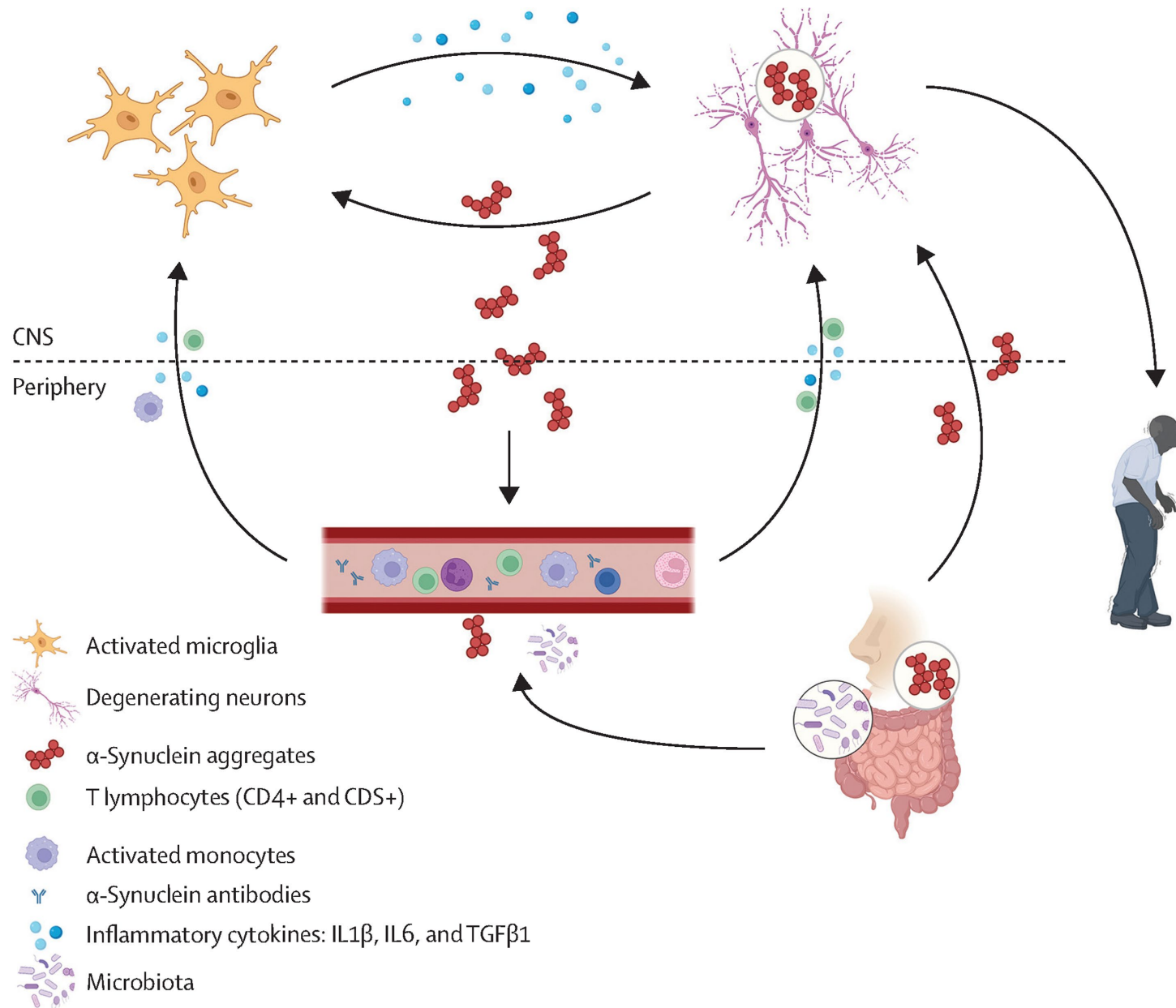


- Loss of dopamine affects other neurotransmitters in different ways

What is Parkinson's disease ?



- the α -Synuclein “misfolds” and aggregates (clumps) as Lewy Body pathology in the surviving neurons,
- resulting in characteristic movement impairment



What do we mean by environmental?

- Solvents and Heavy Metal Exposure
- Pesticides, herbicides, fungicides <https://www.uclahealth.org/news/researchers-identify-10-pesticides-toxic-neurons-involved>
 - Rotenone (> 45 years in Australia, for the control of non-indigenous fish) and Paraquat (FAME study) Paraquat is a herbicide
 - (TCE) is a simple, six-atom molecule that can decaffeinate coffee, degrease metal parts, and dry clean clothes.
 - * Marines who were stationed at Camp Lejeune had a 70% higher risk of Parkinson's disease than veterans who served at a post across the country, a new study found.
 - Roundup (glyphosate) linked to Parkinson's
- Air pollution – contributes to neuroinflammation and oxidative stress

There are no diagnostic tests to confirm PD

- Laboratory tests – blood /cerebral spinal fluid/ pooh/ urine /sebum

- *No biomarkers (yet)*

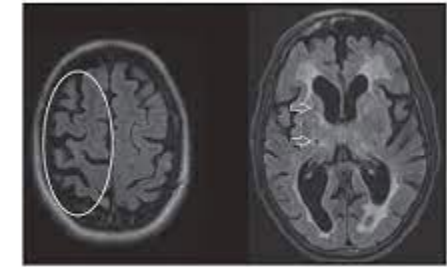


Fig. 4. Axial T2-FLAIR sequences. Left image, asymmetrical cortical atrophy (circled) in a patient with corticobasal syndrome. Right image, hyperintense white matter changes and lacunar infarction (arrowed) in a patient diagnosed with vascular parkinsonism.

- Radiology centres
- MRI Brain are *used to exclude* other causes of Parkinsonism signs
- Some developments in the use of imaging.
- Spect Brain DaTscan – measures levels of dopamine (not on MBS in Australia)

Why Parkinson's is One of the Most Complex diseases ?

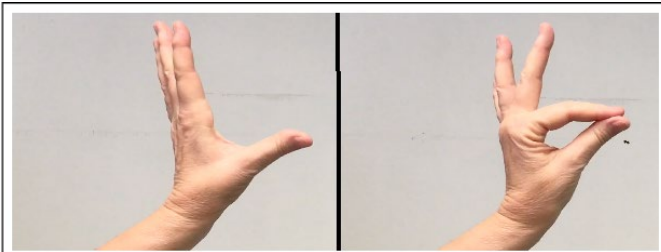
Michael Okun Movement Disorder Specialist- Instagram

Why Parkinson's Is One of the Most Complex Diseases

Dimension	Reason for Complexity
Systems Affected	Motor, cognitive, psychiatric, autonomic, gastrointestinal, and sensory
Etiology	Multifactorial: genetic, environmental, aging, microbiome
Pathology	α -synuclein spread is variable; non-nigral involvement common
Clinical Presentation	Highly variable symptoms and progression rates
Diagnosis	Clinical only; no single biomarker or test
Treatment	Symptom-based, complex polypharmacy, surgical options (DBS, pumps, focused ultrasound)
Global Health	Uneven access to care; rising prevalence

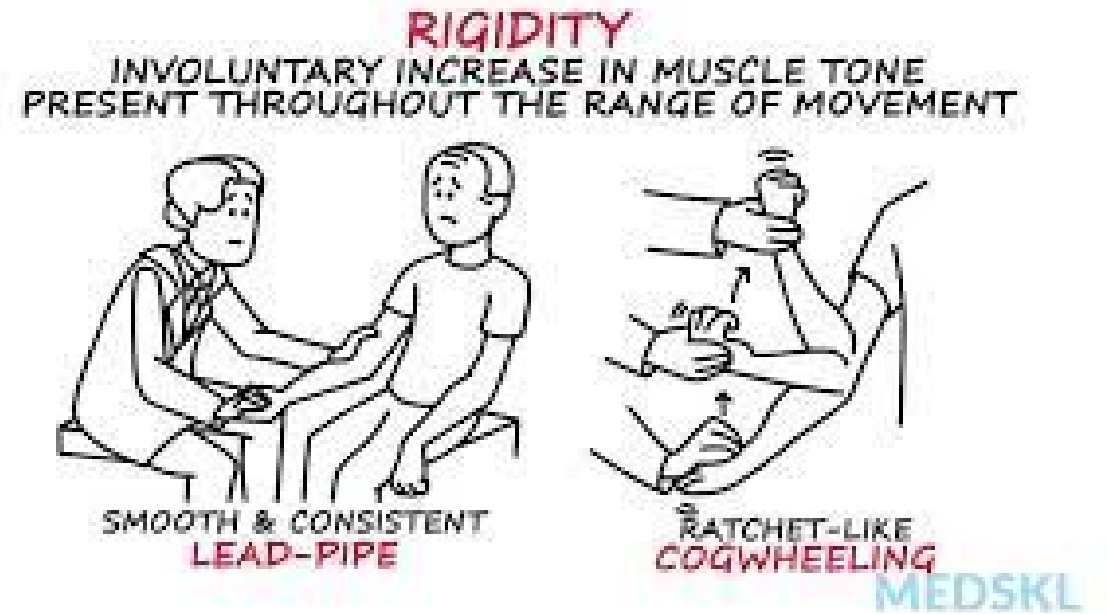
Cardinal features of Parkinson's disease

- **Slowness of movement (Bradykinesia/ akinesia)**
- with decrements in speed/amplitude as movement continues



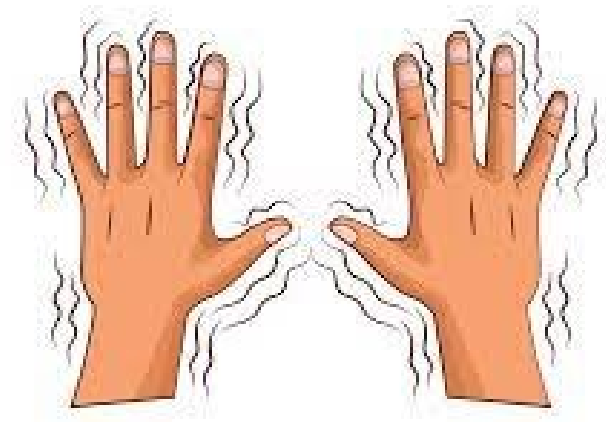
Cardinal features

- **Stiffness / Rigidity**
- Can be measured by Occupational Therapists
- Transferring patients from beds to chairs
- Assistance when walking
- Can't turn over in bed



Cardinal features

- **Tremor**
- This is known as a resting tremor
- 4 – 6 Hz in amplitude
- Goes away when initiating movement
- A pill rolling tremor
- Can occur when your arms are outstretched/ or during movement (e.g finger to nose test)
- Typically starts on one side of your body
- 25% of people diagnosed with Parkinson's will NOT have a tremor



Motor (Movement) and Non-motor symptoms



Management of Parkinson's disease - medication

- Dopamine replacement therapy
- Levodopa/ Carbidopa
- (Sinemet 100/25mg, Kinson 100/25mg, Sinemet CR 200/50mg)

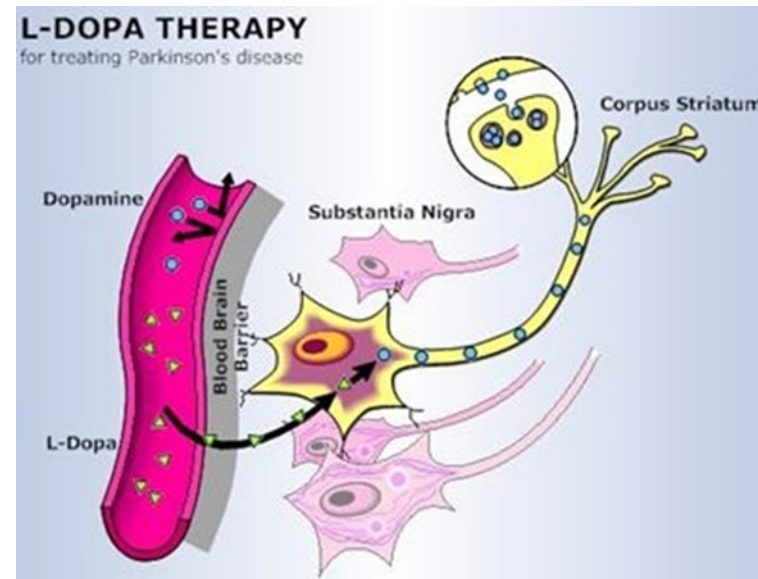


- Levodopa/ Benserazide
- (Madopar 100/25mg , 200/50mg
- Madopar HBS 100/25mg ,
- Madopar Rapid 50/12.5mg or 100/25mg)



How do the tablets (levodopa) work?

- Dopamine cannot cross the blood brain barrier
- Levodopa converts to dopamine
- Anti-parkinson's medications:
 - cause nausea
 - and low blood pressure
- Gentle upward titrations

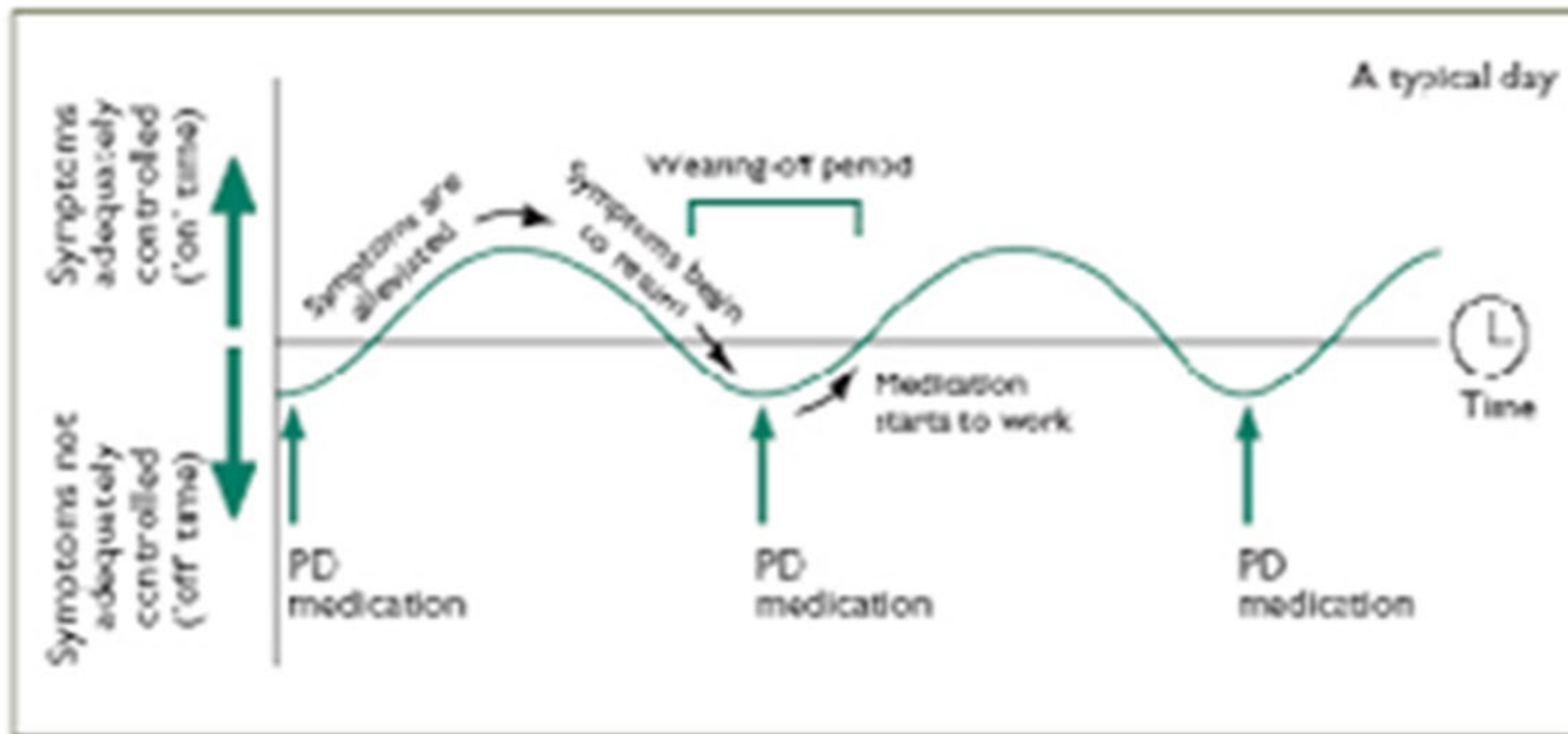


A half empty petrol tank

- Levodopa have a therapeutic window (a time to work) of 60 – 180 minutes
- Daytime regime
- 0700 – fill up the petrol tank
- 1100 – pull in, and fill up again
- 1500 – time to top up the petrol tank again



A dose cycle day , looks like



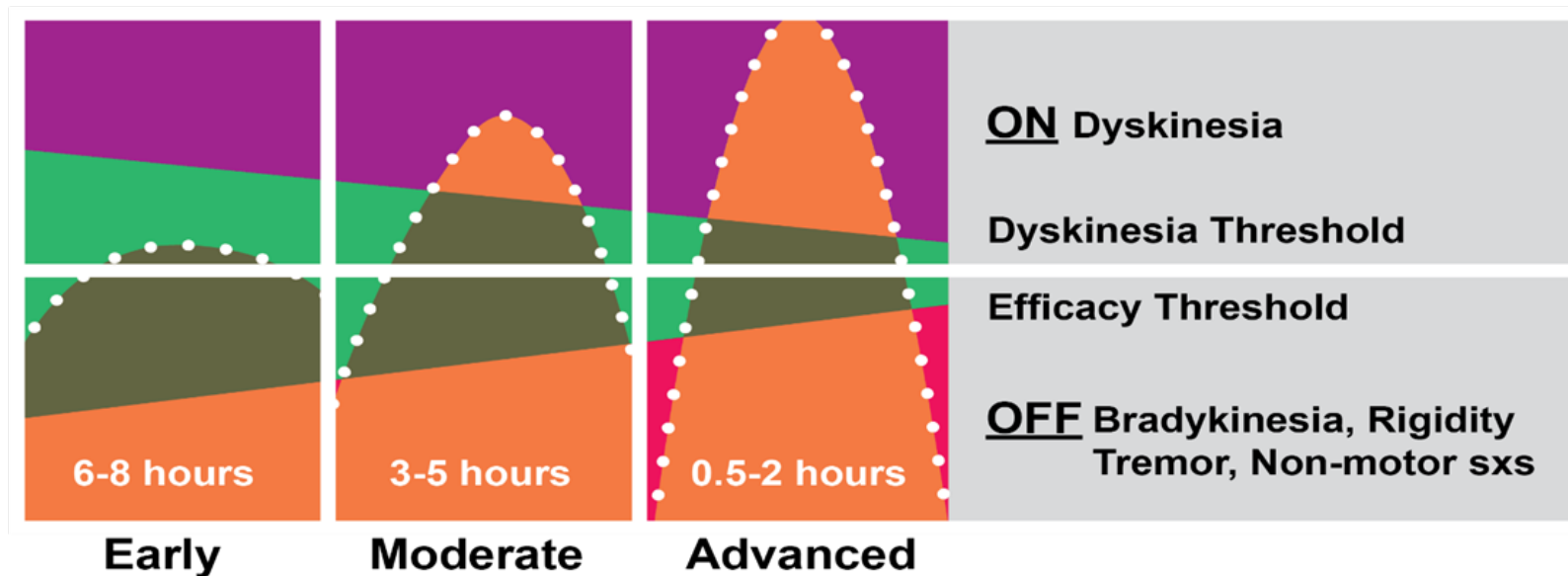
Medications are time critical



- **Time Critical Medications** – within 15 minutes especially as the disease progresses
- Medications are not inter-changeable e.g. Kinson for a Madopar)
- Tablets on an empty stomach ½ hour before food or 2 hours after food
- Protein (amino acids) can impact on the absorption of medication –
- Protein redistribution diet, but nutrition comes first
- Do not stop medications suddenly

Disease Progression

Progression of Parkinson's



Dopamine agonists (binds to and activates)

- Work by attaching to receptors and mimicking dopamine
- Sifrol – Pramipexole (ER)
- Sifrol immediate release- RLS
- Check and double check doses
- Neupro Patch – Rotigotine
- Great for NBM, not as monotherapy
- Therapeutic at 8mg
- *Side effects*
- Nausea , low BP, Impulse Control Disorder



MAO-B inhibitors and COMT inhibitors

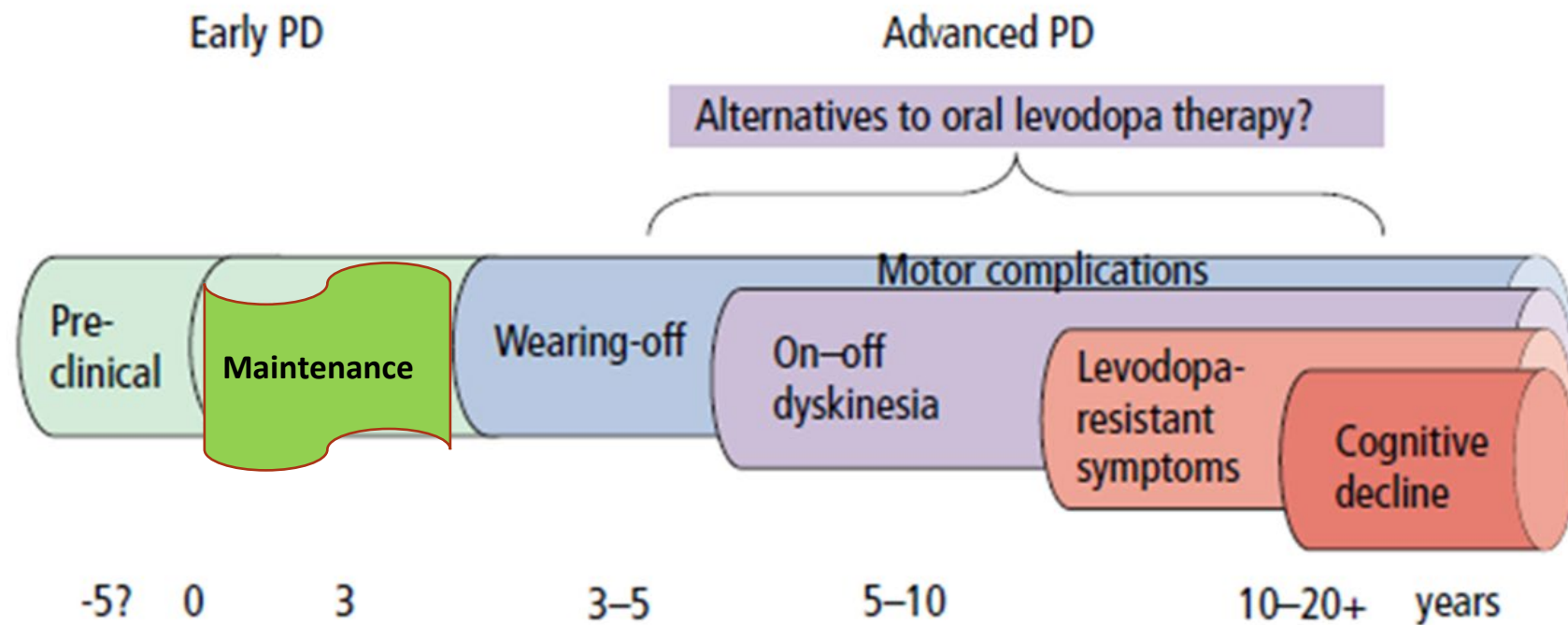
- Used to stop MAO-B and COMT breaking down the good levodopa
- Helps prolong the duration of the Levodopa doses
- MAO-B - Azilect / Xadago – 1 tablet a day
- COMT – Entacapone/Stalevo – with levodopa doses



Medication Responses

- Monitoring of medication responses of your patients
- **Medication ON** – when the medication is working and the patient is at the best level of function – time for personal hygiene, exercise, eating and walking
- **Medication OFF** – is your patient in an OFF state – re-emergent PD Symptoms , slowness, rigidity, increased anxiety, breathlessness,

Progressive disease – Device Assisted Therapies



Device Assisted Therapies DAT's

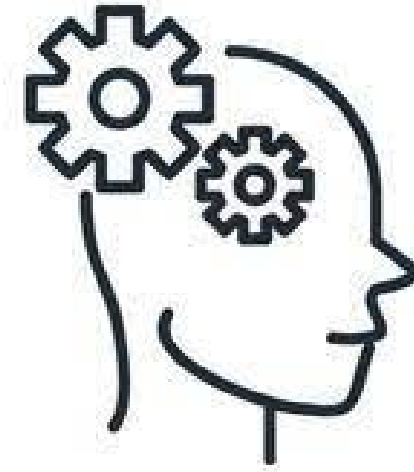
- Considered under “5, 2, 1”
- Deep Brain Stimulation (DBS)
- Duodopa (levodopa/ Carbidopa Intestinal Gel) via a Jejunal tube with a pump
- Apomorphine (dopamine agonist) via subcutaneous infusion with a pump

Advancing disease

- Parkinson's disease progression is highly variable
- Many of the symptoms (non-motor) increase as the disease progresses
- Carer stress / Carer Burden well reported in Parkinsons' and Dementia
- Behaviour management of Neuro-psychoses, Cognition impairment, Sleep fragmentation, worsening mobility , increased falls risk , symptomatic fluctuating blood pressure

Changes to Cognition

- Mild Cognitive Impairment (MCI)
 - Parkinson's Disease Dementia
 - Dementia with Lewy Body
 - Parkinson's with Lewy Body
-
- Difficulty with multi- tasking
 - Viso-spatial (orientating in space) and
 - language – word finding difficulties
 - Bradyphrenia (slowness in thinking)

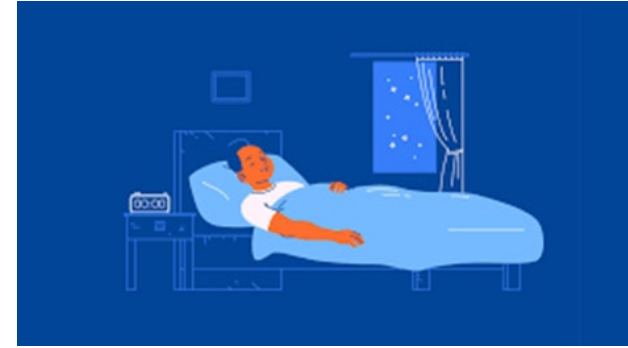


Increased falls risk

- A short shuffling gait?
 - Stooped forward ?
 - Difficulty turning neck and head ?
 - Suffer from **Freezing of Gait**?
 - Postural Hypotension
 - Turning enbloc - Fear of falling
 - Urinary frequency and Urgency / Nocturia
-
- Physiotherapy and OT in modifying home environment – falls risks
 - Recommending mobility aids suitable for person
 - Strategies to assist with freezing of gait
 -



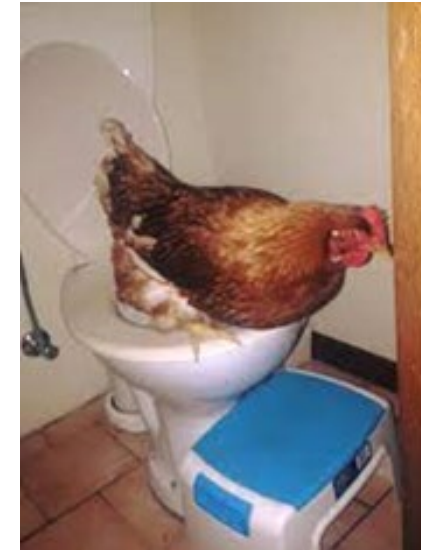
Non-motor symptoms



- **Insomnia** / going to the toilet/ not being able to turn over in bed / vivid dreams and REM Behaviour Disorder / sleep fragmentation
- **Anxiety / Depression / Apathy**
- Loss of dopamine and situational reaction to diagnosis/ loss of independence/ fear of disease future/ social withdrawal / disease stigma

Non-motor symptoms

- **Constipation** in Parkinson's is COMPLEX
- Ensure a daily bowel motion – water / dietary fibre
- PD meds can't reach area of the intestine where they are best absorbed
- Feeling uncomfortable and bloated
- Nauseous and loss of appetite
- Lethargy – reduced exercise worsens
- Small bowel obstructions (volvulus)
- Increased urinary frequency and urgency
- Movicol and Prebiotics / Fluids / Dietary fibre



Urinary frequency and urgency

- Detrusor over-activity by disinhibition of pontine micturition centre
- Over-reactive bladder and sensation to go (even if bladder not full) (Yeo et al, 2012)
- Difficulty with emptying the bladder due to delay or difficulty in relaxation of the urethral sphincter muscles.
- Rule out other causes Diabetes Mellitis, UTI infection
- Continence aids / Sitting on toilet for men and women
- Stop fluids 2 hours before bedtime
- Avoid caffeinated drinks that stimulate the bladder
- Medications – Betmiga/ Vesicare/ Baclofen



Lower blood pressures / feeling cold or hot

- Orthostatic Hypotension
- Postural Hypotension
- Supine Hypertension
- Debilitating and affects QoL



- Strategies to manage include exercise/ water intake/ salt tablets/ abdominal binders and pharmacological (Florinef, Midodrine)
- Temperature dysregulation – hot or cold when others are not- Medical Energy Rebate

Neuro-psychoses

- Degree of cognition impairment / constipation
- Hallucinations – visual , olfactory and tactile
- Delusions – can be paranoid
- (typically those with more cognition impairment)
- Disease progression – Lewy Body in cerebral cortex
- Medications – gentle doses of Quetiapine 12.5mg titration
- OT strategies to manage cognition impairment / carer burden
- **DO NOT USE HALOPERIDOL OR RISPERIDONE**

Voice Changes and Swallowing difficulties

- Softer voices, changes to quality volume
- Asked to “repeat” or “speak up”
- Address dysphagia (swallowing difficulties)
- Allow person time to concentrate on eating and provide suitable implements – don’t rush!
- Supervision at meal times – signs of coughing/ choking
- Risk of aspiration - Ensure person is sitting upright , chin tucked in when swallowing
- Swallowing tablets/ capsules – suitable option?
- Ensure adequate fluids/ appropriate utensils (e.g if tremor, poor cognition)

Occupational Therapist

- A very important member of a person's Care Team
- OT to help people with Parkinson's maintain independence as the disease progresses
- Understand and recognise a person's "set of symptoms – motor and non-motor"
- Understand medication responsiveness / recognise motor fluctuations/ dose failures/ dyskinesia's (Case Study – bathroom renovations)
- Functional reports / NDIS reports / keeping people in work

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