



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 ongoing care of a resident with 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



Normal

Parkinson's Disease

• 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





Pathogenesis of Parkinson's disease

- Our understanding constantly evolving
- A better understanding of the neural (nervous) systems that affect
 - The gut
 - The Autonomic nervous system
 - Sleep
 - Smell
 - Anxiety
 - Cognition



• (Morris et al, 2024)

What do we mean by environmental?

- Solvents and Heavy Metal Exposure
- Pesticides, herbicides, fungicides <u>https://www.uclahealth.org/news/researchers-identify-10-pesticides-toxic-neurons-involved</u>
 - 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 oxidate stress





There are no diagnostic tests to confirm PD

- Laboratory tests blood /cerebral spinal fluid/ pooh/ urine /sebum
- No biomarkers (yet)
- Radiology centres



Fig. 4. Axial T2 FLAIR sequences. Eq1 insign, asymmetrical cortical anophy (minifed) in a patient with corticuloual syndrome. Eggle mage, hyperintense white matter charges and lacence inflaterion (overver) in a patient diagnosed with vescolar parkinsonten.

- 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)





Motor (Movement) and Non-motor symptoms



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 aged care workers
- Stiffness moving a resident around the bed
- Getting a resident up to walk
- 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 and non-motor symptoms

- A short shuffling gait (walking)
- Postural instability and falls
- Changes in facial expression and voice quality
- Slow thinking
- Trouble with hand-writing (usually micro-graphia)
- loss of smell
- REM behaviour disorder- vivid fighting dreams / turning over in bed
- depression & anxiety,
- urinary frequency and urgency
- constipation





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
- Antiparkinson'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 inhibiters

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











Entry to an Aged Care Facility

- Progressive disease
- 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

- Does the resident have
- 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







Non-motor symptoms

- Insomnia / going to the toilet/ not being able to turn over in bed / vivid dreams and REM Behaviour Disorder
- Anxiety / Depression / Apathy



• Loss of dopamine and situational – entering an ACF





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

• Temperature dysregulation – hot or cold when others are not

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
- 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

References

- Morris, H.R., Spillantini, M.G., Sue, C.M., & Williams-Gray, C.H. (2024, January 20). The pathogenesis of Parkinson's disease. Lancet (London, England), 403(10423), 293-304. <u>https://doi.org/10.1016/S0140-6736(23)01478-2</u>
- Ayton, D., Ayton, S., Barker, AL., Bush, AI and Warren, N. (2018). Parkinson's disease prevalence and the association with rurality and agricultural determinants. Parkinsonism & Related Disorders. October 2018.
- Dorsey, E.R., et al., The Emerging Evidence of the Parkinson Pandemic. J Parkinsons Dis, 2018. 8(s1): p. S3-S8.
- Launch of WHO's Parkinson disease technical brief, June 2022 ahttps://www.who.int/news/item/14-06-2022-launch-of-who-s-parkinson-disease-technical-brief
- Jo S, Kim YJ, Park KW, Hwang YS, Lee SH, Kim BJ, Chung SJ. 2021 Association of NO2 and Other Air Pollution Exposures With the Risk of Parkinson Disease. JAMA Neurol. Jul 1;78(7):800-808. doi: 10.1001/jamaneurol.2021.1335. PMID: 33999109; PMCID: PMC8129903.
- Weintraub, D., Aarsland, D., Chaudhuri, K. R., Dobkin, R. D., Leentjens, A. F., Rodriguez-Violante, M., & Schrag, A. (2022). The neuropsychiatry of Parkinson's disease: advances and challenges. The Lancet. Neurology, 21(1), 89–102. https://doi.org/10.1016/S1474-4422(21)00330-6
- Yeo, L., Singh, R., Gundeti, M., Barua, J. M., & Masood, J. (2012). Urinary tract dysfunction in Parkinson's disease: a review. International urology and nephrology, 44(2), 415–424. https://doi.org/10.1007/s11255-011-9969-y
- Palma J.-A., Gomez-Esteban J.C., Norcliffe-Kaufmann L., Martinez J., Tijero B., Berganzo K., et al (2015). Orthostatic Hypotension in Parkinson Disease: How Much You Fall or How Low You Go?. Movement Disorders, 30, 639-645. https://doi.org/10.1002/mds.26079https://doi.org/10.1016/j.autneu.2011.02.004.
- Ceravolo R., Rossi C., Del Prete E. & Bonuccelli U. (2016). A review of adverse events linked to dopamine agonists in the treatment of Parkinsons disease. Expert Opinion on Drug Safety, 15, 181-198. https://doi.org/10.1517/14740338.2016.1130128
- Stirpe, P., Hoffman, M., Badiali, D., & Colosimo, C. (2016). Constipation: an emerging risk factor for Parkinson's disease?. European journal of neurology, 23(11), 1606–1613. https://doi.org/10.1111/ene.13082
- Merola, A., Sawyer, R. P., Artusi, C. A., Suri, R., Berndt, Z., Lopez-Castellanos, J. R., Vaughan, J., Vizcarra, J. A., Romagnolo, A., & Espay, A. J. (2018). Orthostatic hypotension in Parkinson disease: Impact on health care utilization. Parkinsonism & related disorders, 47, 45–49. https://doi.org/10.1016/j.parkreldis.2017.11.344

