

Cognitive Changes and Dementia in Parkinson's Disease & Essential Tremor

Michael Mercury PhD
Associate Director, Neurodegenerative Diseases Center

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Michael G. Mercury PhD (Michael.Mercury@northwestern.edu)


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DISCLOSURE OF FINANCIAL RELATIONSHIP


Michael G. Mercury PhD

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Trade Names
The presentation will include discussion of trade names of tests in order to improve communication. Neither Dr. Mercury, or any member of their immediate family have a relevant financial interest or other relationship with the manufacturer(s) of any of the products or providers or of any of the services to be discussed.



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Objectives:

1. Describe the presymptomatic stage
2. Mild Cognitive Impairment
3. Dementia

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People with Parkinson's Disease




Second most common neurodegenerative disease after Alzheimer's Disease

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People with Parkinson's Disease


Second most common neurodegenerative disease after Alzheimer's Disease

Michael J. Fox

Davis Phinney

Mohammed Ali



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Parkinson's Disease







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Social Media: Mark Hogben
<https://www.youtube.com/shorts/3CwoCXf69eY>

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Case: Parkinson's Disease

- Tom Sederoff is a 62-year-old, right-handed, married man with 14 years of education. Parkinson's Disease diagnosed 11/2017.
- Loss of sense of smell—since early 2010s
- History of adult onset anxiety and depression

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Presymptomatic

1. What is "cognition"
2. How do we know what is normal
3. How do we measure cognition?

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Cognition:
 Executive, Language, Memory, &Visuospatial

Frontal Lobe: Executive Functioning Left and Right Hemispheres

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How Do We Measure the Four Cognitive Domains?

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What are the cognitive changes of normal aging?

Seattle Longitudinal Study, started in 1956

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Cognitive Changes in Parkinson's Disease

1. Executive Functioning
2. Language
3. Memory
4. Visuospatial


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Are there Cognitive Changes in Parkinson's Disease???

AN ESSAY ON THE SHAKING PALSY.

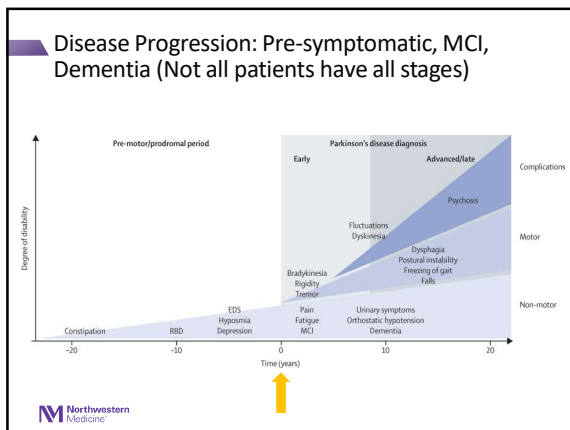
CHAPTER I. DEFINITION-HISTORY-ILLUSTRATIVE CASES.

SHAKING PALSY. (*Paralysis Agitans*.)
 Involuntary tremulous motion, with lessened muscular power, in parts not in action and even when supported, with a propensity to bend the trunk forward, and to pass from a walking to a running pace; the senses and intellects being uninjured.



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Cognitive Changes in Parkinson's Disease

- Specific cognitive deficits can be observed in 30-40% of PD patients
- However, there is **extensive** individual variation in the pattern of cognitive symptoms
 - some people have no identifiable deficits
- These cognitive deficits do not constitute dementia

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Cognitive Changes in PD


Executive Functioning	Impaired
Simple attention	Spared
Psychomotor Speed	Slowed
Language	Spared (speech slowed)
Memory	Impaired free recall
Visuospatial	Impaired

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What is Executive Functioning?


- Concentration
- Maintenance of focus
- Mental flexibility
- Multi-tasking
- Initiation
- Persistence/follow through
- Planning organizing, sequencing
- Speed of processing information
- Problem Solving




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Executive Functioning:
Easily affected by depression or anxiety



- Depression also causes slowed processing of information
- Anxiety interferes with attention and concentration
- Apathy (e.g. issues in initiation, sustaining, and/or completing tasks; loss of positive reinforcement) can result from loss of energy, decreased enjoyment and sleep disturbance secondary to depression

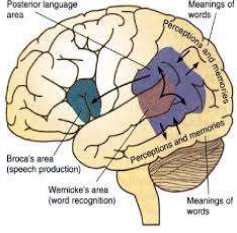



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Language (Spared)

Executive Dysfunction on Speed of Processing Information

- Slow speech pattern
- Slowness of thought in conversations
- Word finding difficulties

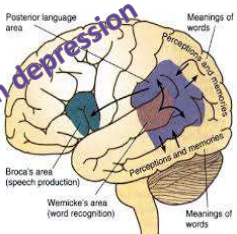

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Language (Spared)

Executive Dysfunction on Speed of Processing Information

- Slow speech pattern
- Slowness of thought in conversations
- Word finding difficulties

All are worse with depression

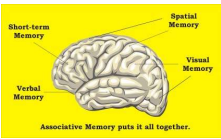

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What is Memory?

Learning: process of acquiring new information

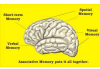
Memory: persistence of learning that can be revealed at a later time

Retrieval: involves either recalling (remembering) or recognizing (being reminded, familiarity)





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Memory Changes in Parkinson's




- People may **recall less** than expected for their age, however, people with Parkinson's Disease are **not** forgetting the information
- They can recognize an age-appropriate amount of information and so benefit from cues, reminders.
- If you see "forgetting," think vitamin B12 deficiency, anxiety, hearing loss etc.
- Depression affects memory the same way



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What is included in the Visuospatial Domain?

- **Spatial Awareness**
Your body's position in relation to your surroundings
- **Understanding nonverbal cues**
(e.g. facial emotion)
- **Contrast Sensitivity/Color Vision**
Ability to discriminate an object from its background



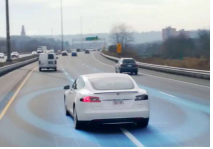
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Visuospatial Changes in Parkinson's Disease

- Spatial Awareness**



Running into the door frame




Drifting toward yellow line
(lane keeping assist)




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Visuospatial Changes in Parkinson's Disease


- Nonverbal Cues**



"the furtive glance from across the room"




Your angry, hurt face



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Visuospatial Changes in Parkinson's Disease

- Contrast Sensitivity**
Ability to discriminate an object from its background



- Diminished Color Vision**


Other visual issues include: eye movements, depth perception, peripheral vision, face recognition, motion and object perception, and visuospatial construction (Weil et al., 2016).



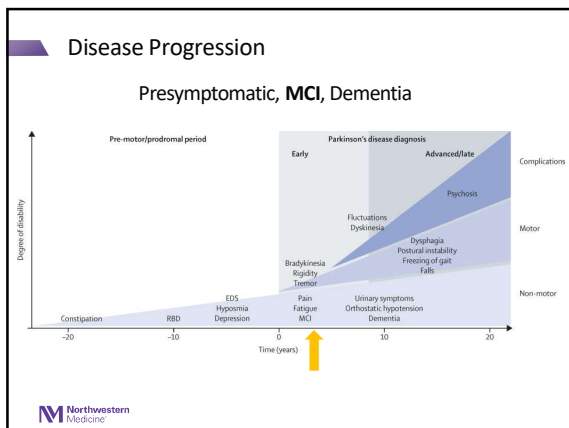
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Mild Cognitive Impairment (MCI)

- A. Defining MCI
- B. Managing MCI in PD
 - LSVT
 - LSVT Big
 - Occupational Therapy (OT)
 - Cognitive Rehabilitation
 - Vocational Evaluation, Peer Support




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Case: Parkinson's Disease

- Tom: "I am a very active person in my house, when I get up in the morning, running—I do sometimes forget things, but I attribute that I have so many things on my list, so many things going on at the same time, sometimes loss of focus from amount of work to do."
- Non Motor:
 - Sleep -- sleep maintenance
 - dream enactment—has punched wife twice;
- Other:
 - impulse control—no;
 - swallowing problems—intermittent;
 - cognitive problems: denies.



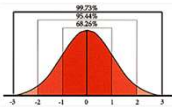

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Mild Cognitive Impairment (MCI)

2 Criteria have to be met

Impaired neuropsychological testing:
Cognitive Performance 1.5 standard deviations below age and education matched normal.

Intact Instrumental Activities of Daily Living (IADLs):
Cognitive Performance causes an *inconvenience* but patients are functioning independently in the community.

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Mild Cognitive Impairment (MCI): *aka DSM V Minor Neurocognitive Disorder*

- Cognitive deficits not sufficient to interfere with functional independence
- MCI prevalence was 40% on a total sample of 7053 patients (Baiano et al., 2019)
- Need to exclude other explanations for cognitive impairment –for example; delirium, stroke, depression, metabolic abnormalities, adverse effects of medication, or head trauma
- No other PD-associated comorbid conditions have influenced testing –for example: motor impairment, severe anxiety/depression, excessive daytime sleepiness, or psychosis

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Revised MCI

Jak et al. (2009) Criteria

- The Jak et al (2009) criteria for Petersen's Mild Cognitive Impairment (MCI) require **at least two impaired test scores** (>1 SD below normative means) within a cognitive domain.
- Reliance on a single neuropsychological test for MCI increases risk of false positive errors (Edmonds et al. 2015).
- The Jak et al (2009) criteria have been also confirmed in old-old individuals (age 75+) by Wong et al (2019).

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Managing PD and MCI


- Lee Silverman Voice Therapy (LSVT) and LSVT—Big
- Exercise (Rock Steady Boxing)
- Cognitive rehabilitation from Speech Therapy and Occupational Therapy
- Vocational Services for people still working
 - Peer Support Group for people with PD who are working
 - Vocational Evaluation for people with PD who need to identify another area of work

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Case: Parkinson's Disease

- The neuropsychological profile reveals the following salient deficits: memory and executive functioning. Verbal memory revealed a retrieval memory problem with a word list. With nonverbal memory, he also demonstrated a retrieval memory problem.
- With executive functioning some difficulty with conceptualization (clock), cognitive flexibility (Trails B, phonemic fluency), proactive interference (MoCA words on HVLT).



- Anxiety clearly interfered with his cognitive performance.
- IADLs are intact

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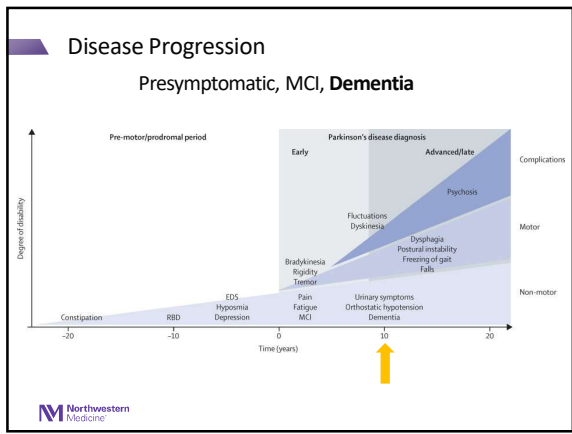
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Dementia

- Defining Dementia
- Types of Dementia
- Parkinson's Disease Dementia and Lewy Body Dementia
- Parkinsonian Symptoms Misinterpreted as Dementia
- Management of Dementia

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Dementia

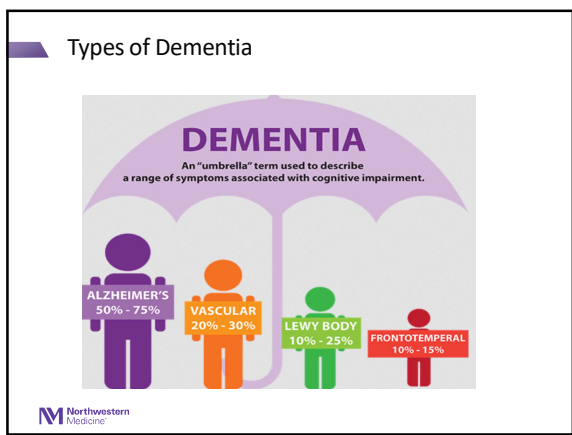
aka DSM V Major Neurocognitive Disorder

“Umbrella Term” used to describe a condition where two criteria are met:

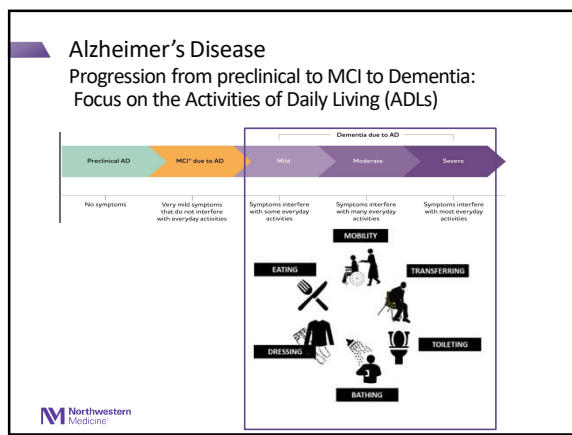
- 1. Impaired Neuropsychological Testing:** Cognitive Performance 1.5 standard deviations below age and education matched normal.
- 2. Impaired Instrumental Activities of Daily Living:** Cognitive Performance *prevents* patients from functioning independently in the community

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Dementia Diagnoses and “Severity”

- Diagnosis: F03.90 (ICD-10 CM) Dementia without behavioral disturbance, unspecified dementia type.
- Diagnosis: F03.91 (ICD-10 CM), 294.21 (ICD-9-CM) Dementia, unspecified, with behavioral disturbance.

Note: the absence of specific neuropsychological findings is not evidence of the absence of cerebral pathology, many of which are silent in the neuropsychological sense.

- **With behavioral disturbance (**specify disturbance):** If the cognitive disturbance is accompanied by a clinically significant disturbance (e.g. psychotic symptoms, mood disturbance, agitation, apathy, or other behavioral symptoms)
- ***Current severity:** Mild—difficulties with IADLs (housework, managing money), Moderate—difficulties with basic activities of daily living (feeding, dressing), Severe: fully dependent

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CDR

<https://knightadrc.wustl.edu/professionals-clinicians/cdr-dementia-staging-instrument/cdr-scoring-table/>

CDR™ Scoring Table

CDR™ Scoring Table	0	0.5	1	2	3	
Memory	No memory loss or slight recent forgetfulness	Consistent small forgetfulness, partial recall of events, things, people	Marked memory loss, some recent events, things, people, but not with everyday activities	Severe memory loss, only recall of recent events, things, people	Severe memory loss, only recall of recent events, things, people	Severe memory loss, only recall of recent events, things, people
Orientation	Fully oriented	Fully oriented except for slight difficulty with time	Markedly difficult with time, orientation, and other aspects of orientation, but not with personal history	Severe difficulty with time, orientation, and other aspects of orientation, but not with personal history	Severe difficulty with time, orientation, and other aspects of orientation, but not with personal history	Severe difficulty with time, orientation, and other aspects of orientation, but not with personal history
Judgment & Problem Solving	Seeks and readily obtains help and advice from others	Slight impairment in using common sense, and other aspects of judgment, but not with personal history	Markedly difficult in using common sense, and other aspects of judgment, but not with personal history	Severe impairment in using common sense, and other aspects of judgment, but not with personal history	Severe impairment in using common sense, and other aspects of judgment, but not with personal history	Severe impairment in using common sense, and other aspects of judgment, but not with personal history
Community Affairs	Independent function in social and family life	Slight impairment in social and family life	Markedly impaired in social and family life	Severe impairment in social and family life	Severe impairment in social and family life	Severe impairment in social and family life
Home and Hobbies	Life at home, hobbies, and interests are well maintained	Life at home, hobbies, and interests are slightly impaired	Markedly impaired in life at home, hobbies, and interests	Severe impairment in life at home, hobbies, and interests	Severe impairment in life at home, hobbies, and interests	Severe impairment in life at home, hobbies, and interests
Personal Care	Fully capable of self-care	Needs prompting	Requires assistance in dressing, hygiene, feeding, and personal care	Requires assistance in dressing, hygiene, feeding, and personal care	Requires assistance in dressing, hygiene, feeding, and personal care	Requires assistance in dressing, hygiene, feeding, and personal care

Score only an decline from previous usual level due to cognitive loss, not impairment due to other factors.

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Workup for Dementia

Studies Recommended by the American Geriatrics Society for Patients with Suspected Dementia

LABORATORY TESTS	IMAGING TESTS	TESTS TO CONSIDER IN PATIENTS WITH SPECIFIC RISK FACTORS
Calcium level	Computed tomography or magnetic resonance imaging of the brain if any of the following are present: Abrupt or rapid decline	Cerebrospinal fluid analysis
Complete blood count		Human immunodeficiency virus test
Complete metabolic panel	Age younger than 60 years	Lyme titer
Folate level	Focal deficits	Rapid plasma reagin test
Thyroid-stimulating hormone level*	Predisposing conditions	
Vitamin B ₁₂ level	Consider positron emission tomography if definitive diagnosis will change management decisions	

**—The only tests routinely recommended by the American Academy of Neurology for all patients with suspected dementia are thyroid-stimulating hormone and vitamin B₁₂ levels.³²*



Adapted from Am Fam Physician. 2011 Oct 15;84(8):955-952



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Cognitive Impairment workup to rule out other causes!






- Full medical workup: Primary Care Physician, Movement Disorders neurologist, and/or Geriatrician
- Check labs; chemistry, thyroid, B12
- Medication Review
 - Avoid anticholinergics! PM Products ☹️
- Physical Problems: Pain, Constipation

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Cognitive Impairment workup to rule out other causes! (continued)


- Sensory Issues: Hearing or Vision Loss
- Sleep problems; rule out sleep apnea
- Alcohol, cannabis use
- Depression, Anxiety, Stress

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Parkinson's Symptoms Misinterpreted as Dementia-Verbal


- Hypophonia (Quiet voice)
- Psychomotor Slowing (slow to respond)



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Parkinson's Symptoms Misinterpreted as Dementia-Nonverbal

- Reduced or "frozen" expression "masked-like"
- Reduced eye blink rate
- Reduction in body language e.g. limited, rigid gesturing not timed with verbal expression it is meant to accompany
- Bent posture can reduce eye contact
- Patient unaware they communicate differently than before or do not come across as they intend do
- Patient has difficulty interpreting the other person's nonverbals (e.g. happy, sad)



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Risk Factors for Parkinson's Disease Dementia


- Older age
- Longer disease duration
- Older age at disease onset
- Severity of parkinsonism



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Parkinson's Dementia


- Estimated to 3.6% of all dementia cases are PD Dementia
- Cumulative incidence rates of over 80% in patients followed for >20 years Pd
- The general pattern is one of executive dysfunction and impaired visuospatial function, with less prominent memory deficits and relatively preserved language functioning.
- In contrast to Alzheimer's, insight at least partially preserved through in Parkinson's Disease



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Clinical Features of Parkinson's Disease Dementia


- **Cognitive Impairment**
 - Executive dysfunction
 - Impaired visuospatial function (less memory problems and relatively preserved language)
- **Neuropsychiatric**
 - Apathy
 - Changes in mood, including depression or anxiety
 - Visual hallucinations (50% of all PD patients with/without dementia)
 - Paranoid delusions
 - Excessive daytime sleepiness
 - Sleep disturbances, including fragmentation, nightmares, and REM sleep behavior disorder



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Criteria for Lewy Body Dementia

- Dementia
 - Impaired thinking skills that interfere with independence in everyday life
- At least 2 of the following clinical symptoms
 - Fluctuating, unpredictable changes in thinking, attention, alertness
 - Repeated visual hallucinations
 - REM sleep behavior disorder
 - parkinsonism




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Parkinson's Disease Dementia vs. Lewy Body Dementia

- **Parkinson's Disease Dementia:** Dementia develops after an established motor disorder, we call the disease PDD
- **Dementia with Lewy Bodies:** Dementia develops prior to or at the same time as the motor disorder, we call the disease DLB. Core features: fluctuating cognition, recurrent visual hallucinations. Second most common dementia after Alzheimer's.
- **Continuum?** Despite differences in the initial sequence of symptoms, the underlying brain changes are very similar leading some researchers to believe they are on a continuum of a similar disease process




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Issues in late Parkinson's Disease Dementia

- Decision-making is impaired
 - Assure Powers of Attorney for Healthcare and Finance are completed early when patient has decisional capacity
- Important Issues
 - Driving
 - Living alone
 - Taking medication
 - Finances




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The "Hot Button Issue"

Driving safety is often one of the earliest issues to be confronted.


In contrast to what many patients and caregivers may believe, driving impairment in patients with mild to moderate PD is correlated mostly with **cognitive and visual deficits**, rather than motor impairment



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Symptom Management



- The treatment of PD dementia (PDD) is symptomatic. No therapies have been shown to modify the course of the disease or influence prognosis.
- **Cholinesterase inhibitors** — many studies of cholinesterase inhibitors in PDD have noted a mild to moderate benefit but an increased risk of side effects, including worsened tremor and nausea
 - **Rivastigmine** –overall, 15 percent of patients benefited from treatment (Maidment et al., 2006)
 - **Donepezil** – randomized study of 550 patients with PDD, some possible benefit for executive function
- **Memantine** – 24 week study with 72 patients with PDD or DLB showed some improvement on a clinical global impression of change



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Wellness in Advancing Dementia: *Meaning, Purpose, and Dignity*

We all need meaning and purpose in our lives. Just because a loved one has cognitive problems does not mean that they cannot contribute and be connected to others, even if the job they do is imperfect. We all need to be treated with dignity.


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People with Essential Tremor

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People with Essential Tremor



Katharine Hepburn



Senator Robert Byrd

Sandra Day O'Connor



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Essential Tremor






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Essential Tremor

(Louis, 2000)


Charles Dana (New York Neurologist, 1887) "It is entirely distinct from paralysis agitans, in the fact of its **hereditary, non-progressiveness**, and absence of any other neuromotor or vasomotor symptoms."

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Case: Essential Tremor


- Janet Miller is a 73-year-old, right-handed Caucasian female with essential tremor. Started on left side about 15 years ago and began to limit her 8-10 years ago. Spread into R hand, and coordination on L is now also affected. Balance has declined as well.
- No falls. Vocal tremor, voice cracks. Difficulty to put on make up, jewelry, button, cook, chop. Eating not affected as is right handed. Better with EtOH.
- Non Motor: She also c/o anxiety and stress. Denies cognitive problems. Difficulty staying asleep.



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Essential Tremor

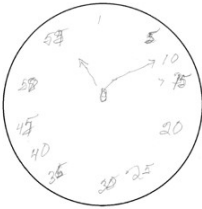
- Most common cause of action tremor, affects 1% of people worldwide and about 5% of people over age 60.
- ET increases risk for both amnesic and non-amnesic MCI (executive dysfunction)
- ET may be associated with an increased risk of dementia




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Case: Essential Tremor

- The neuropsychological profile reveals the following salient deficits: conceptualization and oral processing speed. She had difficulties representing a clock although she conceptually had an accurate spatial representation of the hand placement.




- With intact IADLs r/o MCI




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Essential Tremor: Stay Tuned!

- Most prevalent movement disorder
- Is a neurodegenerative disease (Benito-Leon, 2014)
- May be the **most common neurodegenerative disease** (Louis & McCreary 2021)
- Premotor cognitive decline (Benito-Leon, 2013)
- Cognitive deficits (Lombardi, 2001): executive functioning (working memory, set-shifting—**Trails B**, verbal fluency), language (**naming**).
- Depression



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Objectives:

1. Describe the presymptomatic stage
2. Mild Cognitive Impairment
3. Dementia

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