Movement Disorders:
Parkinson’s Disease in the Hospital

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Outline

- Review of Parkinson’s Disease
- Typical Medications
- The PD Patient in the Hospital
- Questions
Epidemiology

- At least 500,000 people affected in US
- 50,000 new cases each year
- Average age of diagnosis is 60
- Men > Women

NINDS website
Braak Hypothesis

Braak, Neurobiology of Aging, 2003
Clinical Symptoms

- Bradykinesia
- Rest tremor
- Rigidity
- Decreased facial expression
- Decreased blink rate (dry eyes)
- Dysarthria (hypophonia, stutter)
- Dysphagia
- Stooped posture
- Shuffling gait
- Imbalance
- Freezing
- Difficulty rising
- Loss of fine motor control
Non-Motor Symptoms

- Sleep disturbance
- Loss of sense of smell
- Drooling
- Pain
- Cramping
- Constipation
- Urinary incontinence
- Hypotension
- Diaphoresis
- Seborrheic dermatitis
- Sexual dysfunction
- Depression
- Anxiety
Mechanism of Action of PD Drugs

- MAOB I
- Dopamine Agonists
- Astrocyte
- BBB
- Dopamine
- Neuron
- Levodopa
- Amantadine
- Carbidopa
- Entacapone
- ACh
Levodopa

BBB

Dopamine

Astrocyte

ACh

Carbidopa

Entacapone
Levodopa

- Approved by FDA 1967
- Main benefit: Replaces Dopamine
- Side effects: Many, Motor fluctuations
- Forms
  - Carbidopa/Levodopa SA 10/100, 25/100, 25/250
  - Carbidopa/Levodopa CR 25/100, 50/200
  - Carbidopa/Entacapone/Levodopa (Stalevo)
Carbidopa and COMT inhibitors

Carbidopa

AAADDC

L-Dopa

Dopamine

BBB

L-Dopa

Dopamine

Entacapone

COMT

3 O-methyldopa
Carbidopa

- Main benefit: reduces side effects of Levodopa
  - Prevents breakdown in the periphery but cannot cross the BBB
- Forms: Lodosyn
COMT Inhibitors

- Entacapone (Comtan)
  - Side effects: turns urine orange, explosive diarrhea (5%)
- Tolcapone
  - More effective than Comtan
  - Greater side effects: diarrhea (15%) and possible severe liver disease
Dopamine Agonists

Dopamine

Astrocyte

Neuron

BBB

ACh
Dopamine Agonists

- Main benefits: control of motor symptoms, longer half life than Levodopa, less concern about timing
- Side Effects:
  - Impulse control disorder: hyper-sexuality, gambling, shopping, eating
  - Edema, sudden sleep attacks
- Forms: Ropinirole, Pramipexole, Bromocriptine, Pergolide, Cabergoline, Lisuride
MAO-B Inhibitors

- **Main benefits**
  - Mild symptom relief
  - Smoothes On/Off, helps dyskinesia
  - Neuroprotection?

- **Side effects**
  - Hallucinations, insomnia, hypotension
  - With SSRIs possible serotonin syndrome

- **Forms**
  - Selegiline *(Eldepryl, Zelpar)* Daily or BID
  - Rasagiline *(Azilect)* Daily
Anticholinergics

- Earliest Class used in PD
- Main benefit: Tremor control
- Side Effects: Memory loss, urinary retention, constipation, delirium, hallucinations
- Trihexyphenidyl (Artane), Benztropine, Ethopropazine
Amantadine

- Is an anti-viral medication - PD benefits discovered by accident
- Has many effects in the brain - Exact mechanism of action unclear
- Main benefits: Reduces motor fluctuations and dyskinesia
- Side effects: hallucinations, insomnia, agitation, difficulty concentrating, dry mouth, edema, livedo reticularis
Deep Brain Stimulation

[Diagram showing the components of Deep Brain Stimulation, including the leads of the stimulator, extension, and implanted pulse generator (battery)]

Pictures from Medtronic
Why do Patients with PD go to the hospital?

- 5-15% Primary diagnosis is PD Motor symptoms
- Most: falls, fracture, infection, syncope, encephalopathy/dementia, cardiac disease, GI disease

Woodford, Movement Disorders, 2005
Temlett, Int Med J 2006
## Problems for the PD patient

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Timing of medications

- Why so complicated?
  - On/Off phenomena, Dyskinesia, Dystonia, Freezing

- Protein interferes with Levodopa crossing BBB
  - Ideally Levodopa should be given 1 hour before or 2 hours after protein
Timing of Medications

- When administering use specific times rather than “QID” etc..
- If possible allow self administration
Timing of Medications

- Parkinson’s Disease Society in UK
  - “Get it on time” campaign
Timing of medications

- Do not stop Levodopa or dopamine agonists abruptly
  - Can lead to neuroleptic malignant-like syndrome
Treating Delirium

- Avoid most antipsychotics
- The extrapyramidal side effects will worsen motor symptoms and motor fluctuations
  - Haloperidol, risperidone, olanzapine, aripirazole, zisprasidone
- OK to use
  - Quentiapine, clozapine
Treating Nausea

- Avoid Prochlorperazine, promethazine, metoclopramine
- These have extrapyramidal side effects
- OK to use
  - Odanestron, trimethobenzamide
DBS

- Can interfere with EKG
- Can interfere with electric cauterization during surgery
- Patients have a “patient access” device and can turn the stimulator on and off

- Patients generally can not get MRI - rarely can be done with specific protocols
Thank you!

Questions?