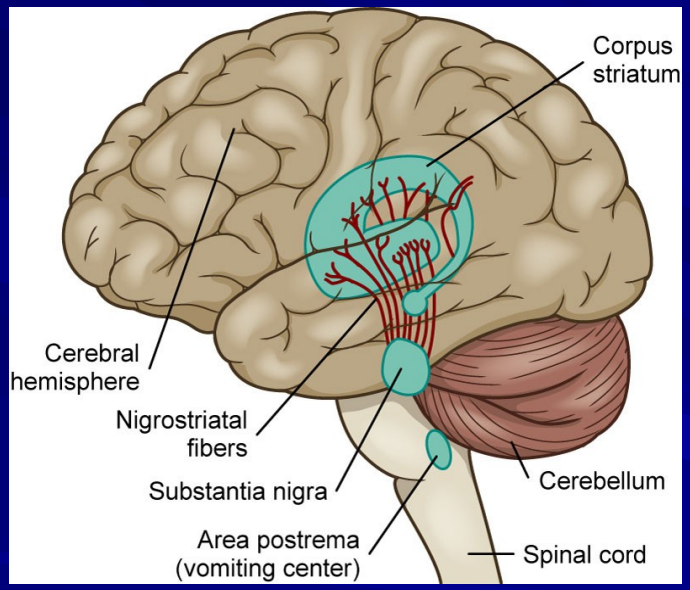
Chronic Neurologic Disorders
Parkinson's Disease



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Parkinson's Disease (PD)

- Chronic, progressive neurodegenerative disease of the CNS
- Manifesting primarily in motor dysfunction
- Primarily of idiopathic origin
- 1.5x to 2x more common in males
- Begins between ages 40-70 years
  - 4% diagnosed before 50

PD: Etiology & Pathophysiology

- Exact cause of PD unknown
  - Possibly a result between environmental factors and person's genetic makeup
    - Family history in 15% of cases
    - Risk ↑ by well water, pesticides, herbicides, industrial chemicals, wood pulp mills, rural residence

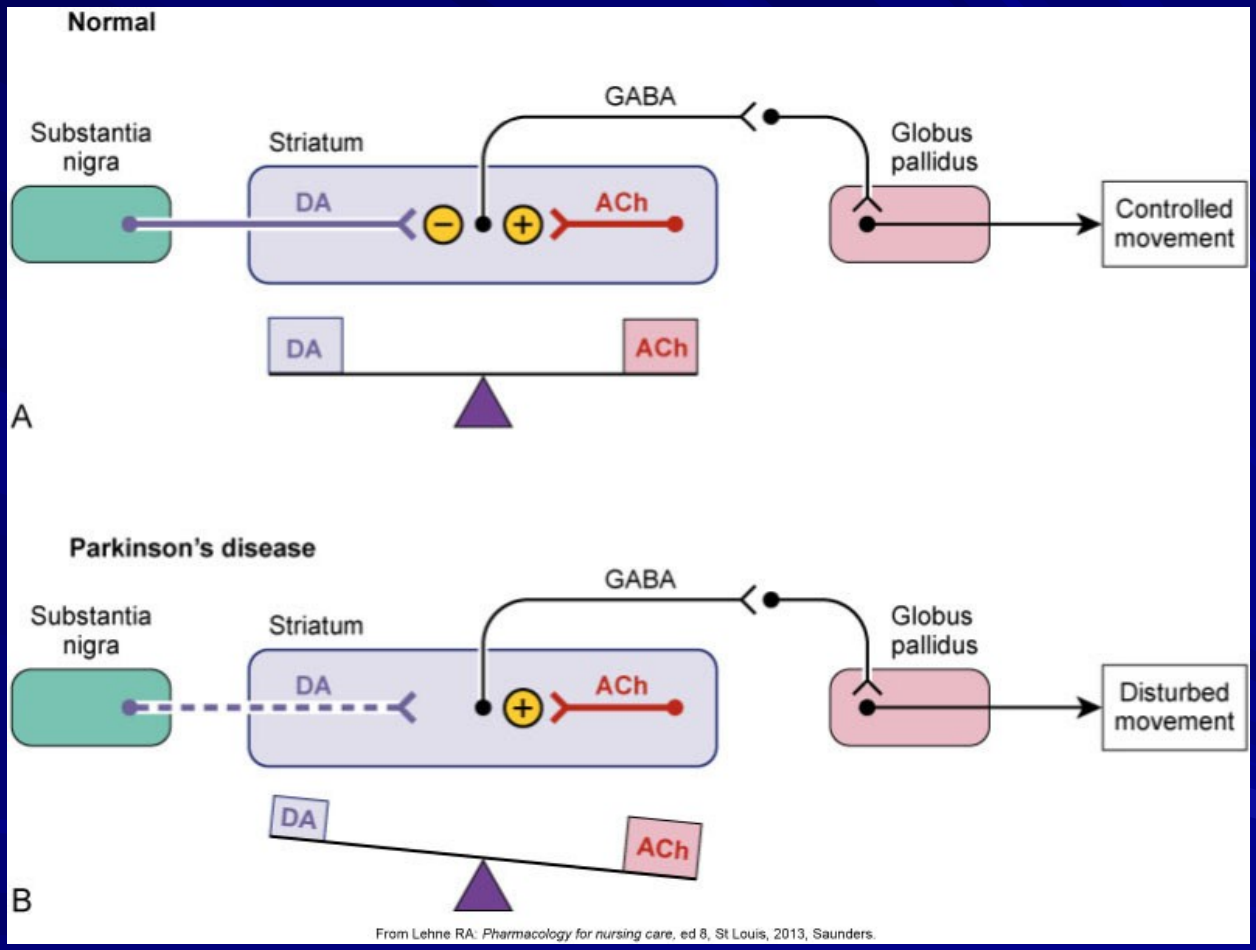
PD: Etiology & Pathophysiology

- Many forms of secondary/atypical parkinsonism exist
  - Exposure to chemicals
  - Drug-induced
    - Prescribed
    - Illicit
  - Others

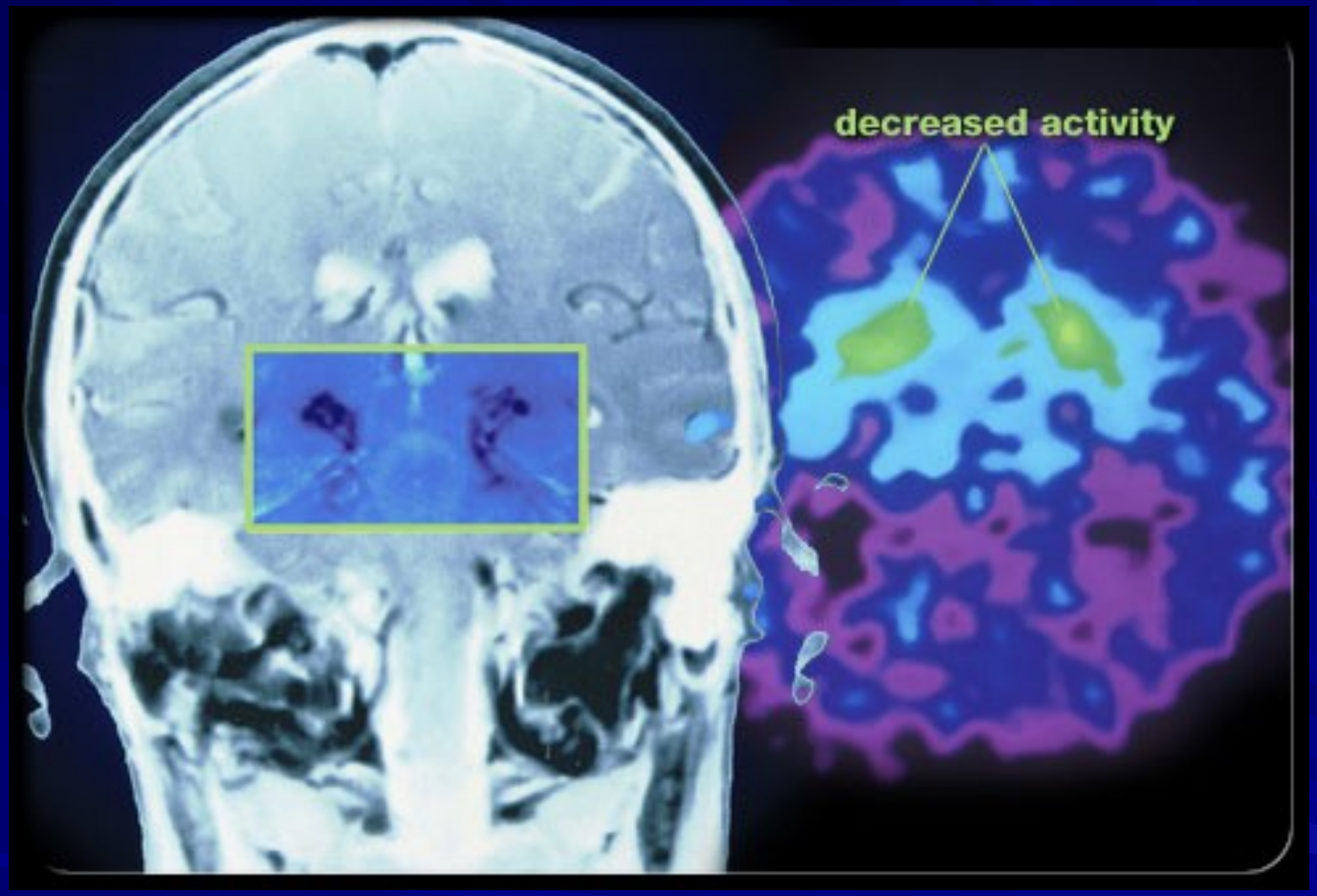
PD: Pathophysiology

- Lack of dopamine (DA)
  - Degeneration of dopamine-producing neurons in substantia nigra of midbrain
  - Disrupts dopamine-acetylcholine balance in basal ganglia
  - Essential for normal functioning of extrapyramidal motor system
- Clinical symptoms appear with 60% neuron loss and 80% dopamine decrease

Dopamine Disorder in PD



From Lehne RA: *Pharmacology for nursing care*, ed 8, St Louis, 2013, Saunders.


decreased activity

PD: Clinical Manifestations

- Onset is gradual and insidious with ongoing progression
- **TRAP**
  - **T**remor
  - **R**igidity
  - **A**kinesia
  - **P**ostural instability

PD: Clinical Manifestations

- Beginning stages
  - Mild tremor, slight limp, ↓ arm swing
- Later stages
  - Shuffling, propulsive gait with arms flexed, loss of postural reflexes
- 90% experience hypokinetic dysarthria (speech abnormalities)

PD: Clinical Manifestations

- **Tremor**
  - Often first sign
  - Initially minimal
  - More prominent at rest
  - Aggravated by
    - Emotional stress
    - ↑ Concentration

PD: Clinical Manifestations

- Pill rolling hand tremor
- Diaphragm, tongue, lips, jaw may be involved
- Essential tremor is not associated with PD
  - Occurs during voluntary movement, has more rapid frequency, is familial

PD: Clinical Manifestations

- **Rigidity**
  - ↑ Resistance to passive motion when limbs are moved through their ROM
  - Cogwheel rigidity
    - Jerky quality
    - Like intermittent catches in passive movement of a joint
  - Sustained muscle contraction
    - Complaints of soreness
    - Feeling tired and achy
    - Pain in the head, upper body, spine, or legs
  - Slowness of movement

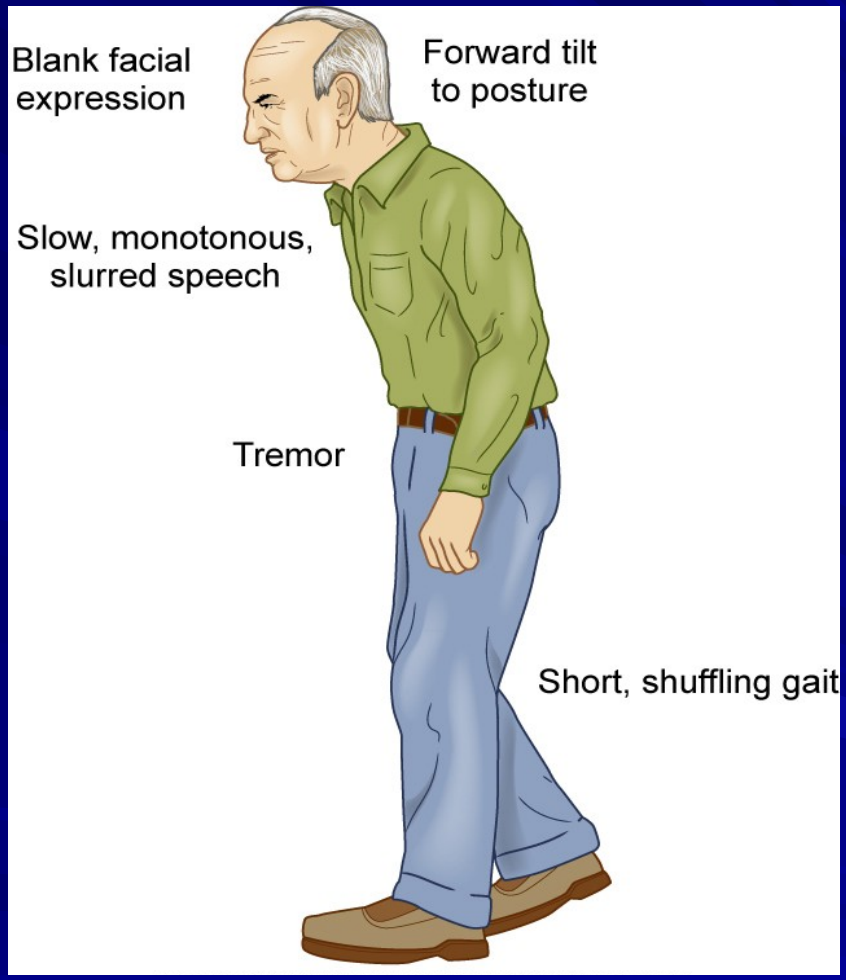
PD: Clinical Manifestations

- **Akinesia**
  - Absence or loss of control of voluntary muscle movements
- **Bradykinesia**
  - Slowness of movement
  - Particularly evident in the loss of automatic movements

PD: Clinical Manifestations

- Loss of automatic movements occur subconsciously and result in classic characteristics of a person with PD
  - Stooped posture
  - Masked face
  - Drooling
  - Festination (shuffling gait)

Appearance of Patient with PD



PD: Clinical Manifestations

- **Nonmotor symptoms**
  - Depression and anxiety
  - Apathy
  - Fatigue
  - Pain
  - Urinary retention and constipation
  - Erectile dysfunction
  - Memory changes

PD: Clinical Manifestations

- **Sleep problems are common**
  - Difficulty staying asleep
  - Restless sleep
  - Nightmares
  - Drowsiness during the day
  - REM behavior disorder
    - Violent dreams
    - Potentially dangerous motor activity during sleep

PD: Complications

- Complications ↑ as disease progresses
  - Motor symptoms
  - Weakness
  - Akinesia
  - Neurologic problems
  - Neuropsychiatric problems
- Dementia often results
  - Associated with ↑ mortality

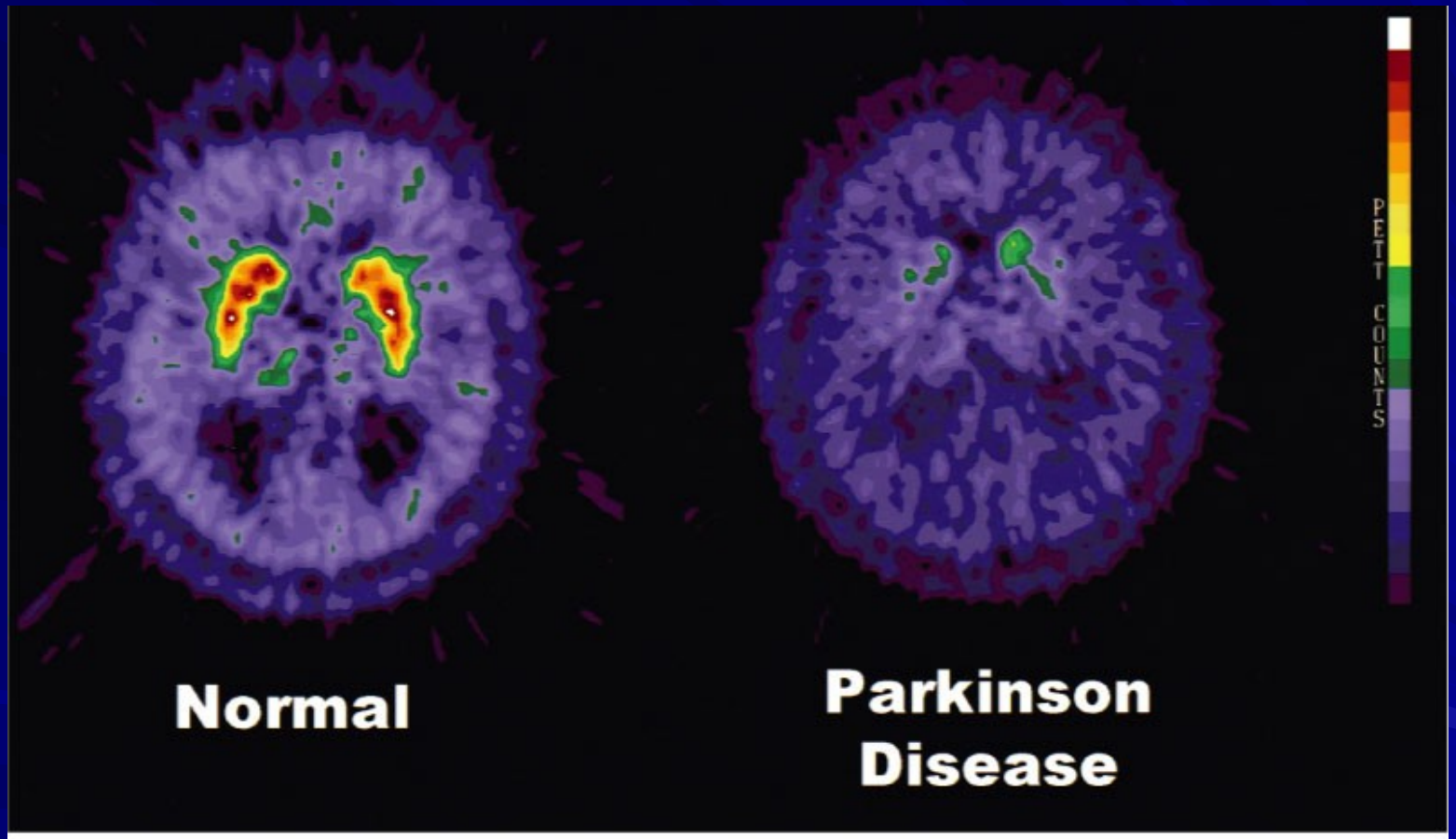
PD: Complications

- Dysphagia may result in malnutrition or aspiration
- General debilitation may lead
  - Pneumonia, UTIs, skin breakdown
- Orthostatic hypotension
  - ↑ risk for falls and injuries

PD: Diagnostic tests

- No definitive diagnostic procedures
- Patient history & clinical features
- Presence of 2 or more cardinal manifestations: TRAP
- Medical history, presenting symptoms, neurologic exam
- Positive response to antiparkinsonian drugs

PET Scan in PD



From Aminoff MJ, Daroff RB: *Encyclopedia of the neurological sciences*, Waltham, Mass., 2003, Academic Press.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PD: Drug Therapy

- Aimed at correcting imbalances of neurotransmitters within the CNS
- Antiparkinsonian drugs either
  - Enhance or release supply of dopamine
  - Antagonize or block the effects of overactive cholinergic neurons in the striatum

PD: Drug Therapy

- **Therapeutic goals**
  - Ideal treatment that reverses neuronal degeneration or prevents further degeneration does not exist
  - Improve the patient's ability to carry out the activities of daily life
  - Drug selection and dosages are determined by the extent to which PD interferes with work, dressing, eating, bathing, and other ADLs

PD: Drug Therapy

- Two Major categories
  - Dopaminergic agents
    - Most commonly used drugs for PD
    - Promote activation of dopamine receptors
    - Levodopa
  - Anticholinergic agents
    - Prevent activation of cholinergic receptors
    - Benztropine (Cogentin)

Levodopa

- Highly effective, but benefits diminish over time
- Orally administered; rapidly absorbed from small intestine
  - Food delays absorption
  - Neutral amino acids compete with levodopa for intestinal absorption & for transport across blood-brain barrier
  - High-protein foods reduce therapeutic effects

PD: Drug Therapy

- Levodopa/carbidopa (Sinemet)
- **MOA**: Levodopa is converted to dopamine in the CNS. Carbidopa prevents peripheral destruction of levodopa
- **Adverse Effects**: N/V, dyskinesias, postural hypotension, dysrhythmias, psychosis, impulse control, darkened sweat & urine, loss of effect

PD: Drug Therapy

- **Dopamine Agonists**
- First drug of choice for mild or moderate symptoms
- Direct activation of dopamine receptors
  - Less effective than levodopa
  - Not dependent on enzymatic conversion to be active
  - Does not compete with dietary proteins
  - Lower incidence of response failure
  - Less likely to cause dyskinesias

Dopamine Agonists

- Pramipexole (Mirapex)
  - Used alone in early PD and with levodopa in advance PD
  - Maximal benefits take several weeks
  - **Adverse effects**
    - Monotherapy: SLEEP ATTACKS, nausea, dizziness, daytime somnolence, insomnia, constipation, weakness, hallucinations
    - Combined: orthostatic hypotension, dyskinesia, increased hallucinations
    - Rare instances if pathologic gambling & other compulsive self-rewarding behaviors

Anticholinergic

- Trihexiphenidyl & Benztropine
- **MOA**: blocks muscarinic receptors in the striatum. ↓ Activity of ACh
- **Adverse effects**: dry mouth, urinary retention, tachycardia, blurred vision, constipation, photophobia, confusion, hallucinations

COMT Inhibitors

- Inhibit metabolism of levodopa in the periphery
- No direct therapeutic effects of their own
- Two COMT inhibitors available
  - Entacapone (Comtan)
  - Tolcapone (Tasmar)

Entacapone (Comtan)

- Indicated for use with levodopa
- **MOA**: inhibit breakdown of levodopa in the periphery
- **Adverse Effects**: dyskinesia, orthostatic hypotension, N/V/D, hallucinations, sleep disturbances, impulse control disorders, & yellow-orange discoloration of urine

Tolcapone (Tasmar)

- Used only in conjunction with levodopa
- Only if safer agents are ineffective or inappropriate
- **MOA**: inhibits metabolism of levodopa in the periphery
- **Adverse effects**: Liver failure, dyskinesia, orthostatic hypotension, nausea, hallucinations, sleep disturbances, & yellow-orange urine

MAO-B Inhibitors

- Considered first-line drugs for PD
- Benefits are modest
- Combination with levodopa can reduce the wearing-off effect
- Two MAO-B Inhibitors
  - Selegiline
  - Rasagiline

Selegiline (Eldepryl)

- Monotherapy or used with levodopa
- **MOA**: Inhibits breakdown of dopamine
- **Adverse Effects:** insomnia, dry mouth, orthostatic hypotension, dizziness, hypertensive crisis, & GI symptoms

Rasagiline (Azilect)

- Approved for initial therapy & for combined use with levodopa
- Benefits derived from preserving dopamine in the brain
- **Adverse Effects**: insomnia, orthostatic hypotension, irritation of buccal mucosa, hypertensive crisis

PD: Drug Therapy

- Other agents used to manage PD:
  - Antihistamines with anticholinergic or β-adrenergic blockers are used to manage tremors.
  - Antiviral agent amantadine
  - Apomorphine for hypomobility

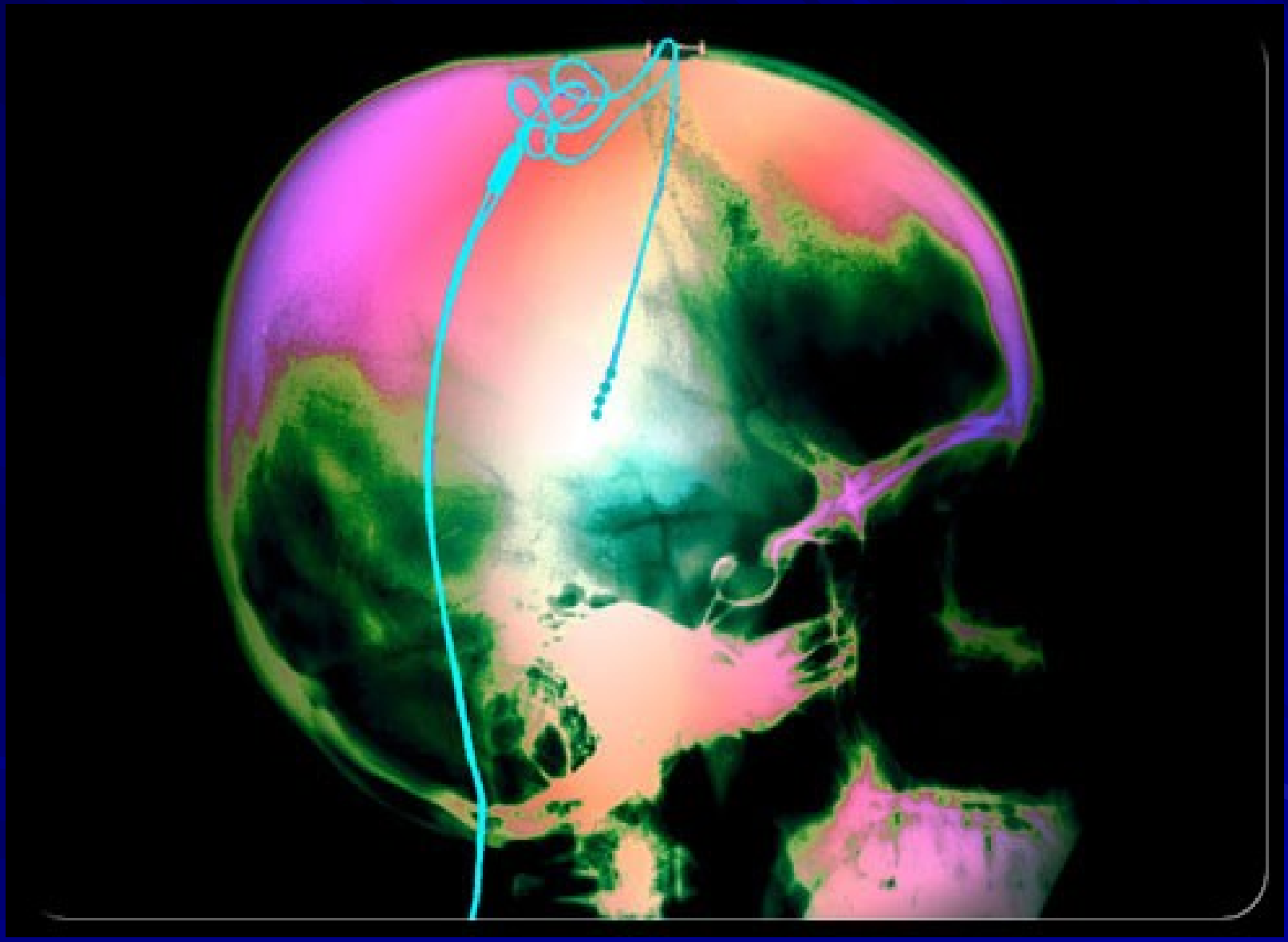
PD: Surgical Management

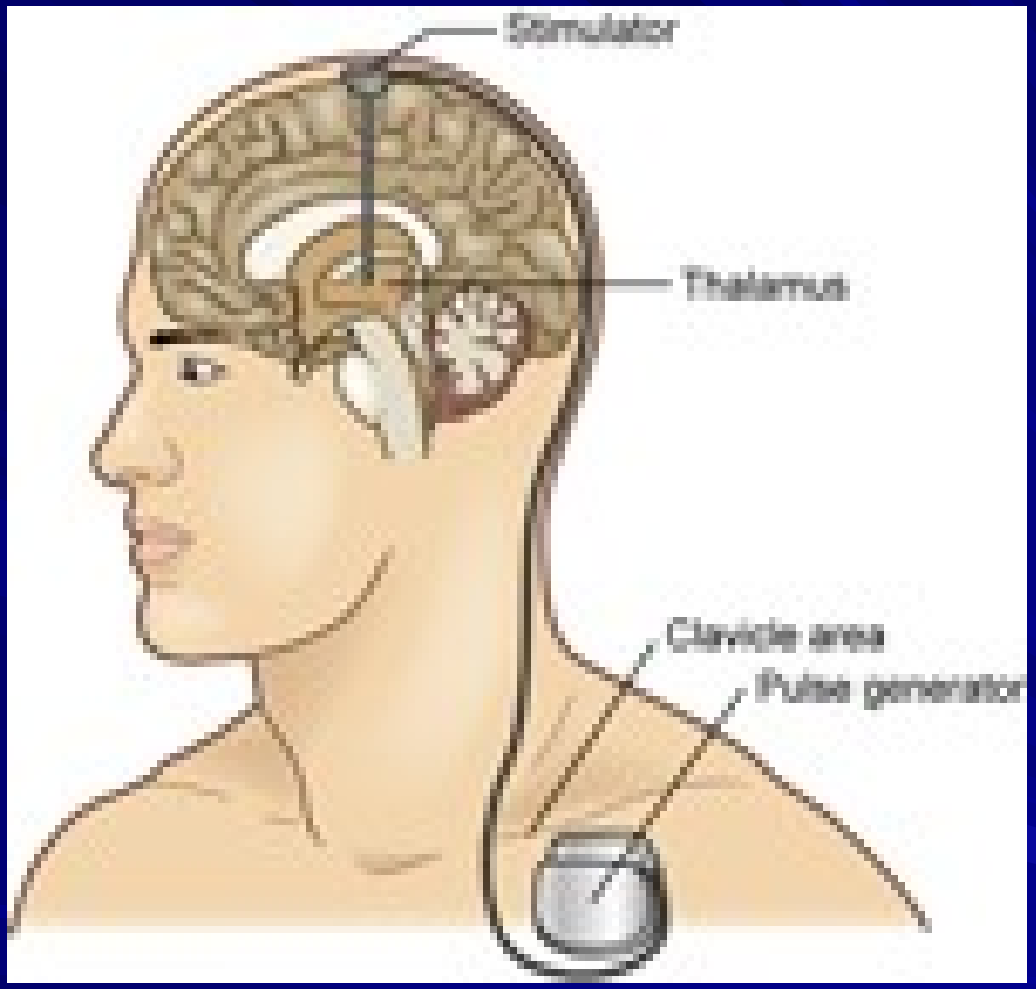
- **Surgical Therapy**
  - Used in patients unresponsive to drug therapy
  - Have developed severe motor complications
- **Deep Brain Stimulation (DBS)**
- **Ablation (Destruction)**
  - Thalamotomy
  - Pallidotomy
  - Subthalamic nucleotomy
- **Transplantation**

- Pallidotomy

Deep Brain Stimulation

- Most common surgical treatment
- Reversible and programmable
- ↓ Increased neuronal activity produced by DA depletion
  - Improves motor function
  - Reduces dyskinesia and medications




Stimulator
Thalamus
Clavicle area
Pulse generator

Ablation Surgery

- Locate, target, destroy area of brain affected by PD
- Destroys tissue that produces abnormal chemical or electrical impulses leading to tremors or other symptoms

Transplantation

- Transplantation of fetal neural tissue into the basal ganglia
  - Provides DA-producing cells in the brain of patients
  - Research and clinical trials ongoing

Interprofessional Care

- **Nutritional Therapy**
  - Malnutrition and constipation can be serious consequences
  - Patients with dysphagia and bradykinesia need food that is easily chewed & swallowed
  - Adequate fiber
  - Eating more numerous small meals
  - Provide ample time

PD: Nursing Diagnoses

- Self-care deficit
- Chronic confusion
- Impaired physical mobility
- Impaired verbal communication
- Impaired swallowing
- Risk for imbalanced nutrition: Less than body requirements

PD: Nursing Management

- Maximize neurologic function.
- Maintain independence in activities of daily living (ADLs) for as long as possible.
- Optimize psychosocial well-being.
- Administer medications as prescribed
- Facilitate nutritional intake
- Interdisciplinary collaboration: PT, OT, Speech


Make Every Step Count
PARKINSON'S
UNITY WALK
BIG