

CNS MEDICATIONS

PTA1010

Following this lecture the student will:

- State the general principles of CNS medications
- Recognize and list common side effects for CNS medications
- State general rehabilitation concerns for this class of medications
- Recognize commonly used medications in this class of drugs

General Usage

- Modifies CNS neurons to treat specific disorders.
- Alters general level of arousal of CNS.
- Medications tend to **affect cortical function indirectly** by first altering the function of lower brain and spinal cord structures.
- Drugs can block ascending or descending information.
- Modify synaptic transmission in some way.



- **Blood-Brain Barrier** refers to the unique structure and function of CNS capillaries, which act as a **selective filter and protects the CNS by** limiting the substances that enter the brain and spinal cord

CNS Medication may be used as:

- Sedative-hypnotic and Anti-anxiety medication
- Affective Disorder medication
- Anti-psychotic medication
- Antiepileptic medication
- Parkinson's Disease medication
- **General or Local Anesthetic**



Common Side Effects

Act as CNS depressant causing:

- Drowsiness
- Muscle relaxation
- Sedation
- Insomnia
- Dyscoordination, Ataxia
- Respiratory Depression
- Tolerance and physical dependence

Special Concerns for Rehabilitation:

Peak blood levels 2-4 hours post administration.

Patient may be groggy

Associated with increased risk for falls

Reduced sensation in area of local anesthetic.

Post-operative cognitive decline possible post general anesthesia (older population).

Case Study 1:

- **Brief History.** R.S. is a 34-year-old construction worker who sustained a fracture-dislocation of the vertebral column in an automobile accident. He was admitted to an acute care facility, where a diagnosis of complete paraplegia was made at the T-12 spinal level. Surgery was performed to stabilize the vertebral column. During the next 3 weeks, his medical condition improved. At the end of 1 month, he was transferred to a rehabilitation facility to begin an intensive program of physical therapy and occupational therapy. Rehabilitation included strengthening and range-of-motion (ROM) exercises, as well as training in wheelchair mobility, transfers, and activities of daily living (ADLs). However, upon arriving at the new institution, R.S. complained of difficulty sleeping. Flurazepam (Dalmane) was prescribed at a dosage of 30 mg administered orally each night at bedtime.
- **Problem/Influence of Medication.** During his daily rehabilitation regimen, the therapists noted that R.S.'s performance and level of attentiveness were markedly poor during the morning sessions. He was excessively lethargic and drowsy, and his speech was slurred. These symptoms were present to a much greater extent than the normal slow start that occurs in some patients on wakening in the morning. The therapists also found that when ADL or mobility training was taught during the morning sessions, there was poor carryover from day to day regarding these activities.
- ***What is the most likely reason for R.S.'s poor performance in the morning rehabilitation sessions?***
- ***What would be the likely solution?***

Case Study 2:

- **Brief History.** J.G., a 71-year-old retired pharmacist, was admitted to the hospital with a chief complaint of an inability to move his right arm and leg. He was also unable to speak at the time of admission. The clinical impression was right hemiplegia caused by left-middle cerebral artery thrombosis. The patient also had a history of hypertension and had been taking cardiac beta blockers for several years. J.G.'s medical condition stabilized, and the third day after admission he was seen for the first time by a physical therapist. Speech therapy and occupational therapy were also soon initiated. The patient's condition improved rapidly, and motor function began to return in the right side. Balance and gross motor skills increased until he could transfer from his wheelchair to his bed with minimal assistance, and gait training activities were initiated. J.G. was able to comprehend verbal commands, but his speech remained markedly slurred and difficult to understand. During his hospitalization, J.G. showed signs of severe depression. Symptoms increased until cooperation with the rehabilitation and nursing staff was compromised. Imipramine (Tofranil) was prescribed at a dosage of 150 mg/day.
- **Problem/Influence of Medication.** Imipramine is a tricyclic antidepressant, and these drugs are known to produce orthostatic hypotension during the initial stages of drug therapy. Because the patient is expressively aphasic, he will have trouble telling the therapist that he feels dizzy or faint. Also, the cardiac beta blockers will blunt any compensatory increase in cardiac output if blood pressure drops during postural changes.

- 1. How can the therapist reduce the risk of orthostatic hypotension during rehabilitation sessions?*
- 2. Will clinicians notice an immediate improvement in J.G.'s mood after starting this antidepressant drug?*

Case Study 3

- **Brief History.** R.F., a 63-year-old woman, has been receiving treatment for schizophrenia intermittently for many years. She was last hospitalized for an acute episode 7 months ago and has since been on a maintenance dosage of haloperidol (Haldol), 25 mg/d. She is also being seen as an outpatient for treatment of rheumatoid arthritis in both hands. Her current treatment consists of gentle heat and active range-of-motion exercises, three times each week. She is being considered for possible metacarpophalangeal joint replacement.
- **Problem/Influence of Medication.** During the course of physical therapy, the therapist noticed the onset and slow, progressive increase in writhing gestures of both upper extremities. Extraneous movements of her mouth and face were also observed, including chewing-like jaw movements and tongue protrusion.

- 1. Why might antipsychotic drugs cause these abnormal movements?*
- 2. What specific movement disorder might be indicated by these symptoms?*
- 3. Why is it critical to resolve this situation as soon as possible?*

Case Study 4

- **Brief History.** F.B. is a 43-year-old man who works in the shipping department of a large company. He was diagnosed in childhood as having generalized tonic-clonic epilepsy, and his seizures have been managed successfully with various drugs over the years. Most recently, he has been taking carbamazepine (Tegretol), 800 mg/d (i.e., one 200-mg tablet, qid). One month ago, he began complaining of dizziness and blurred vision, so the dosage was reduced to 600 mg/d (one 200 mg tablet tid). He usually takes his antiseizure medication after meals. F.B. also takes an antihypertensive (lisinopril, 10 mg/day) and a cholesterol-lowering drug (simvastatin, 20 mg/day). Two weeks ago, he injured his back while lifting a large box at work. He was evaluated in physical therapy as having an acute lumbosacral strain. He attends physical therapy daily as an outpatient. Treatment includes heat, ultrasound, and manual therapy, and he is also receiving instruction in proper body mechanics and lifting technique. F.B. continues to work at his normal job, but he avoids heavy lifting. He attends therapy on his way home from work, at about 5:00 p.m.
- **Problem/Influence of Medication.** F.B. arrived at physical therapy the first afternoon stating that he had had a particularly long day. He was positioned prone on a treatment table, and hot packs were placed over his low back. As the heat was applied, he began to drift off to sleep. Five minutes into the treatment, he had a seizure. Because of a thorough initial evaluation, the therapist was aware of his epileptic condition and protected him from injury during the seizure. The patient regained consciousness and rested quietly until he felt able to go home. No long-term effects were noted from the seizure.
- **1. What factors may have precipitated F.B.'s seizure?**
- **2. What precautions can be taken to prevent additional seizures and guard against injuries if a seizure occurs during a rehabilitation session?**

Case Study 5

- **Brief History.** M.M. is a 67-year-old woman who was diagnosed with Parkinson disease 6 years ago, at which time she was treated with a dopamine receptor agonist (ropinirole, 2 mg three times per day). After approximately 2 years, the bradykinesia and the rigidity associated with this disease began to be more pronounced, so she was started on a combination of levodopa-carbidopa. The initial levodopa dosage was 400 mg/d. She was successfully maintained on levodopa for the next 3 years, with minor adjustments in the dosage. During that time, M.M. had been living at home with her husband. During the past 12 months, her husband noted that her ability to get around seemed to be declining, so the levodopa dosage was progressively increased to 600 mg/d. The patient was also referred to physical therapy on an outpatient basis in an attempt to maintain mobility and activities of daily living (ADL). She began attending physical therapy three times per week, and the therapist initiated a regimen designed to maintain musculoskeletal flexibility, posture, and balance.
- **Problem/Influence of Medication.** The patient was seen by the therapist three mornings each week. After a few sessions, the therapist observed that there were certain days when the patient was able to actively and vigorously participate in the therapy program. On other days, she was essentially akinetic, and her active participation in exercise and gait activities was virtually impossible. There was no pattern to her good and bad days, and the beneficial effects of the rehabilitation program seemed limited by the rather random effects of her medication. The patient stated that these akinetic episodes sometimes occurred even on nontherapy days.
- **1. What is the likely reason for the poor response to anti-Parkinson drugs on certain days?**
- **2. What can be done to resolve this problem and improve the patient's response to drug therapy?**