



Medical Management of Individuals with Brain Injury Living in the Community

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Outline

- **Common Medical Problems**
 - Post-traumatic Seizures/Epilepsy
 - Spasticity
 - Depression/Anxiety
 - Agitation/Aggression
 - Sleep disorders
 - Attention deficits
- **Medications and side effects for each**

Medication Management Philosophy

- Start low and go slow
- Change one medication at a time
 - Adding/stopping medications
 - Changing doses
- Look for medications that can be eliminated before adding others
- Give adequate time for therapeutic effect
- Educate patients and families on reasonable outcomes, targeted effects, side effects
- Treat the “Why” and not the “What”

Post-traumatic Seizures

- **Post-traumatic Seizures**
 - Immediate: first 24 hours
 - Early: 1 – 7 days
 - Late: after 7 days
- **Post-traumatic Epilepsy**
 - Two or more late onset seizures separated by at least 24 hours that is not attributable to other causes (Infections, Electrolytes, Medications)

Post-traumatic Seizures

- Generalized
 - Bilateral hemisphere involvement
 - Also known as “Grand Mal”
 - Nearly all involve loss of consciousness (LOC)
- Partial
 - Unilateral involvement
 - Complex or Simple
 - Complex: (+) LOC
 - Simple: (-) LOC
 - **Most common form found in TBI**

Post-traumatic Seizures

- Generalizations:
 - 80% of seizures will develop in first 2 years
 - Neuro-imaging is NOT helpful in predicting PTS
 - EEG is NOT helpful in predicting PTS
 - False positives and negatives are common

Post-traumatic Seizures

- Treatment
 - Only treat late-onset seizures
 - Tegretol, Depakote, Lamictal, Topamax, Vimpat, Trileptal, Keppra
 - Duration is physician dependent
 - 1st seizure: 18 months
 - Goal is to limit potentially cognitive sedating meds as much as possible
 - 2nd Seizure: 2 years
 - 3rd seizure: lifetime
- **Seizures lasting longer than 5 minutes have a high risk of developing status epilepticus**

Post-traumatic Seizures

- Medications
 - Tegretol (Carbamazepine)
 - Depakote (Valproic Acid)
 - Lamictal (Lamotrigine)
 - Topamax (Topiramate)
 - Keppra (Levetiracetam)
 - Vimpat (Lacosamide)
 - Trileptal (Oxcarbazepine)

Post-traumatic Seizures

- Mechanism of Action
 - Stabilizes cell membranes to decrease frequency of spontaneous firing
- Common Side Effects
 - Lethargy
 - Confusion
 - Dizziness/Gait unsteadiness
 - Weight gain
 - Hepatotoxicity
 - Pancytopenia

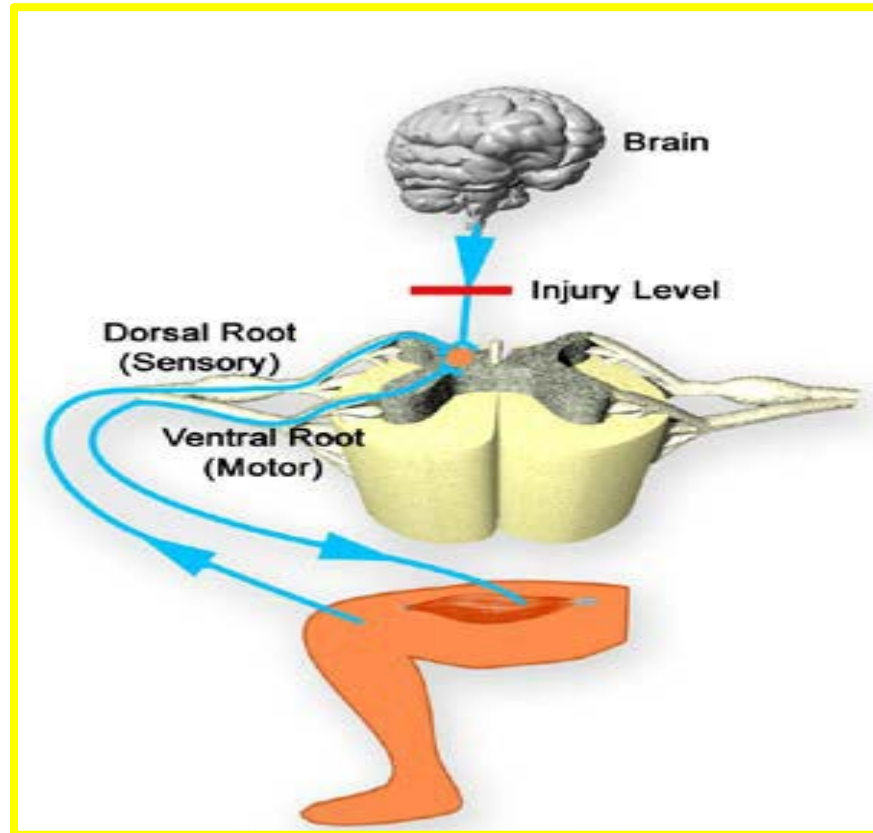
Post-traumatic Seizures

- Monitoring levels
 - Can get levels on any anti-seizure medication to assure therapeutic range
 - CBC, CMP and drug levels every 3 months
- Toxicity effects
 - Marked lethargy/somnolence
 - Hallucinations/Paranoid delusions
 - Fever
 - Depression

Spasticity

- Definition: Velocity dependent increase in muscle tone with resistance to stretch
- Occurs due to deficiency or absent of descending inhibitory pathways
 - Gamma Amino Butyric Acid (GABA) is the primary inhibitory neurotransmitter that turns off the spinal reflex

Spasticity



Spasticity

- Treatments
 - PT/OT for stretching, splinting/casting and modalities (heat, ice, ultrasound, E-Stim)
 - Oral Medications
 - Baclofen, Dantrium, Zanaflex
 - Injections
 - Botulinum toxin, Phenol
 - Invasive treatments
 - Intrathecal Baclofen pump
 - Tendon lengthening procedures

Spasticity

- Medications
 - **Baclofen**
 - **5-20mg TID**
 - Enhances effect of GABA in the CNS in effort to “turn off” the spinal reflex pathway
 - Side effects: weakness, lethargy, confusion, dizziness, respiratory distress
 - Withdrawal: increase muscle tone, itching (without presence of a rash), hallucinations (usually visual), seizures, fever, death
 - Oral or Intra-theal preparations

Spasticity

- Medications (cont.)
 - **Dantrium (Dantrolene Sodium)**
 - **50-100mg BID or TID**
 - Inhibits muscle activity at the muscle itself (only agent that works at the muscle level). Inhibits Calcium release from the sarcoplasmic reticulum.
 - Side effects: **Hepatotoxicity**, weakness, lethargy
 - Monitoring: CBC, CMP every 3 months

Spasticity

- Medications (cont.)
 - Zanaflex (Tizanidine)
 - 2-8mg TID
 - Inhibits descending excitatory pathways both at the brain and spinal cord levels
 - Usually used as an adjunct to other medications
 - Side effects: **hypotension**, **sedation**, fatigue, dizziness, hepatotoxicity

Spasticity

- Injectable treatments
 - Botulinum toxin (Botox, Myobloc, Dysport)
 - Inhibit the release of Acetylcholine into the synapse to prevent muscle contraction
 - Best if localization measures are used
 - EMG, Electrical stimulation, Ultrasound
 - Side effects: Muscle irritation, localized pain, fever, nausea, dysphagia (if used close to the neck)
 - FDA approved for upper extremity spasticity and cervical dystonia only

Depression

- Definition: psychological disorder that presents as a depressed mood, lost of interest or pleasure, feelings of guilt or low self-worth
 - Not just feeling “sad”
- Patients often claim to feel “lost in the world”
- Pathophysiology
 - deficiency in serotonin, norepinephrine and/or dopamine in the Central Nervous System

Depression

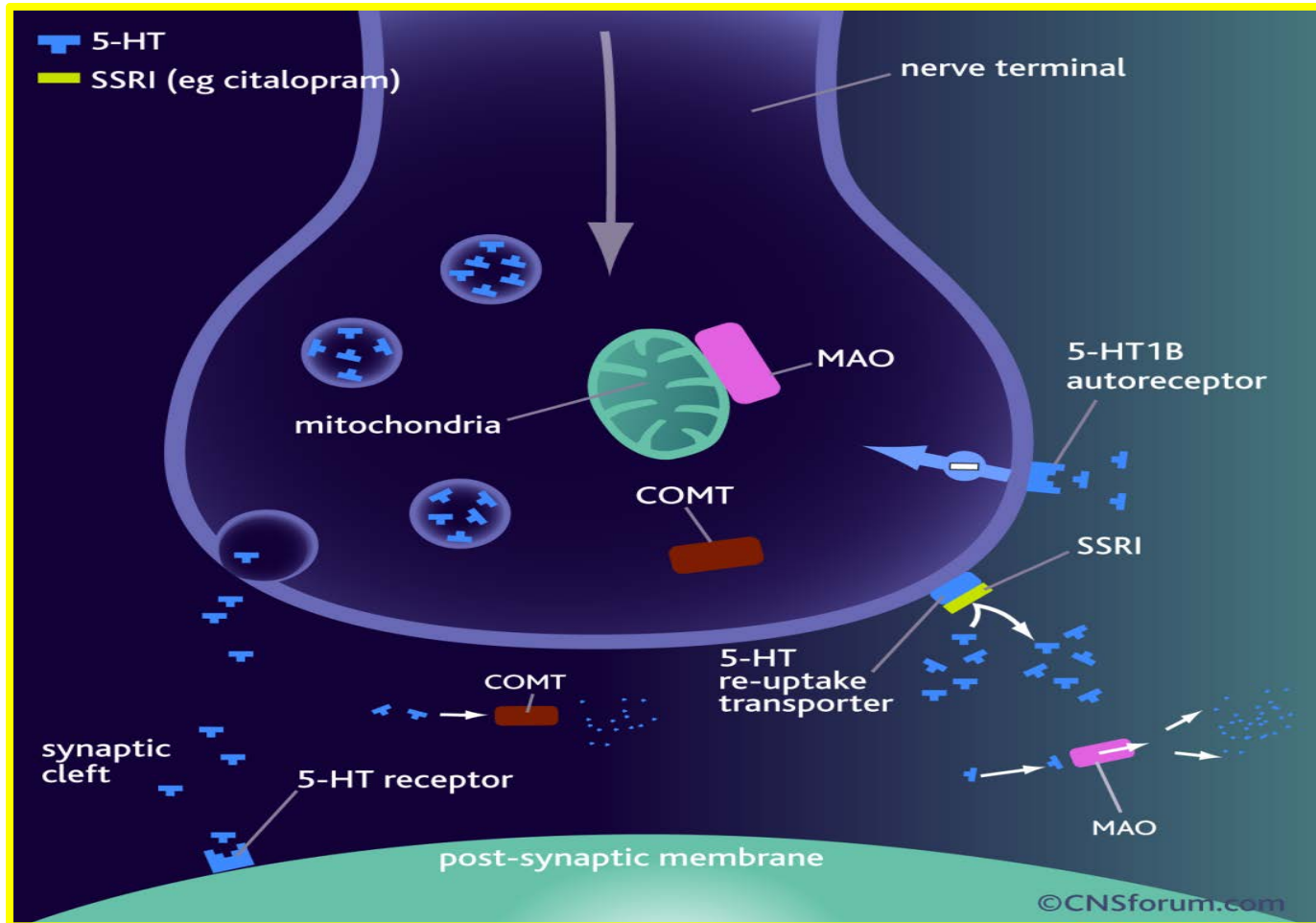
- Medications should be used in conjunction with psychotherapy and counseling
- Medication classes
 - SSRI
 - SNRI
 - TCA
 - “Novel”

Depression

- **SSRIs**
 - Selectively inhibits the reuptake of Serotonin in the synapse making it more available to the post-synaptic membrane

Depression

SSRI Mechanism of Action



Depression

- **SSRIs (cont.)**
 - **Zoloft** (Sertraline) 50-150mg daily
 - **Paxil** (Paroxetine) 20-50mg daily
 - **Celexa** (Citalopram) 10-40mg daily
 - **Lexapro** (Escitalopram) 10-20mg daily
 - **Prozac** (Fluoxetine) 20-80mg daily

Depression

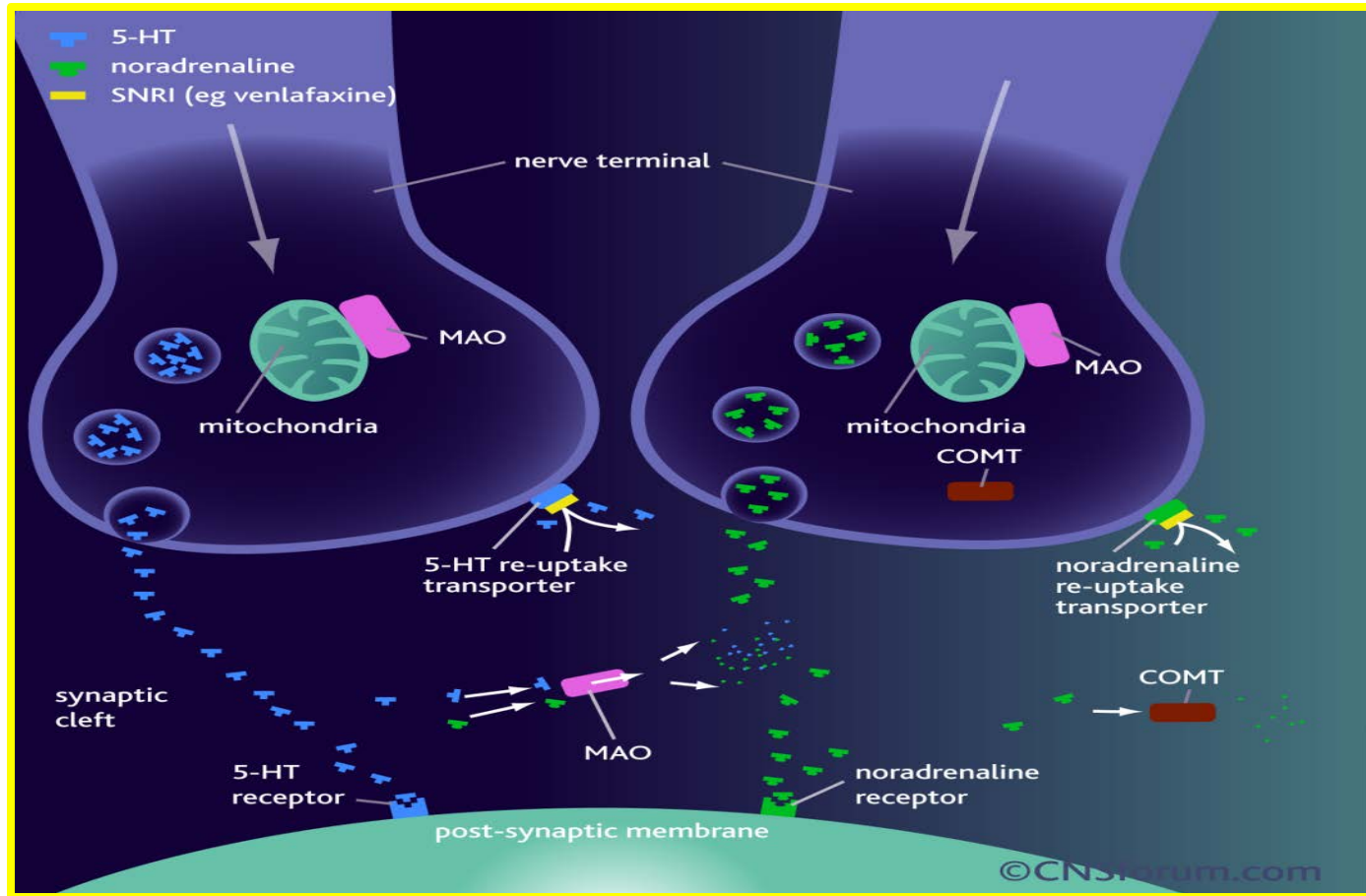
- **SSRIs (cont.)**
 - Side effects: Nausea, Vomiting, Diarrhea, Dry mouth, sedation (esp with Paxil), delayed ejaculation, decreased libido, serotonin syndrome (especially when used with other SSRI's)
 - Must give 3-4 weeks trial before changing dose or switching medications

Depression

- **SNRIs**
 - Inhibits the reuptake of Serotonin and Norepinephrine in the nerve synapse

Depression

SNRI Mechanism of Action



Depression

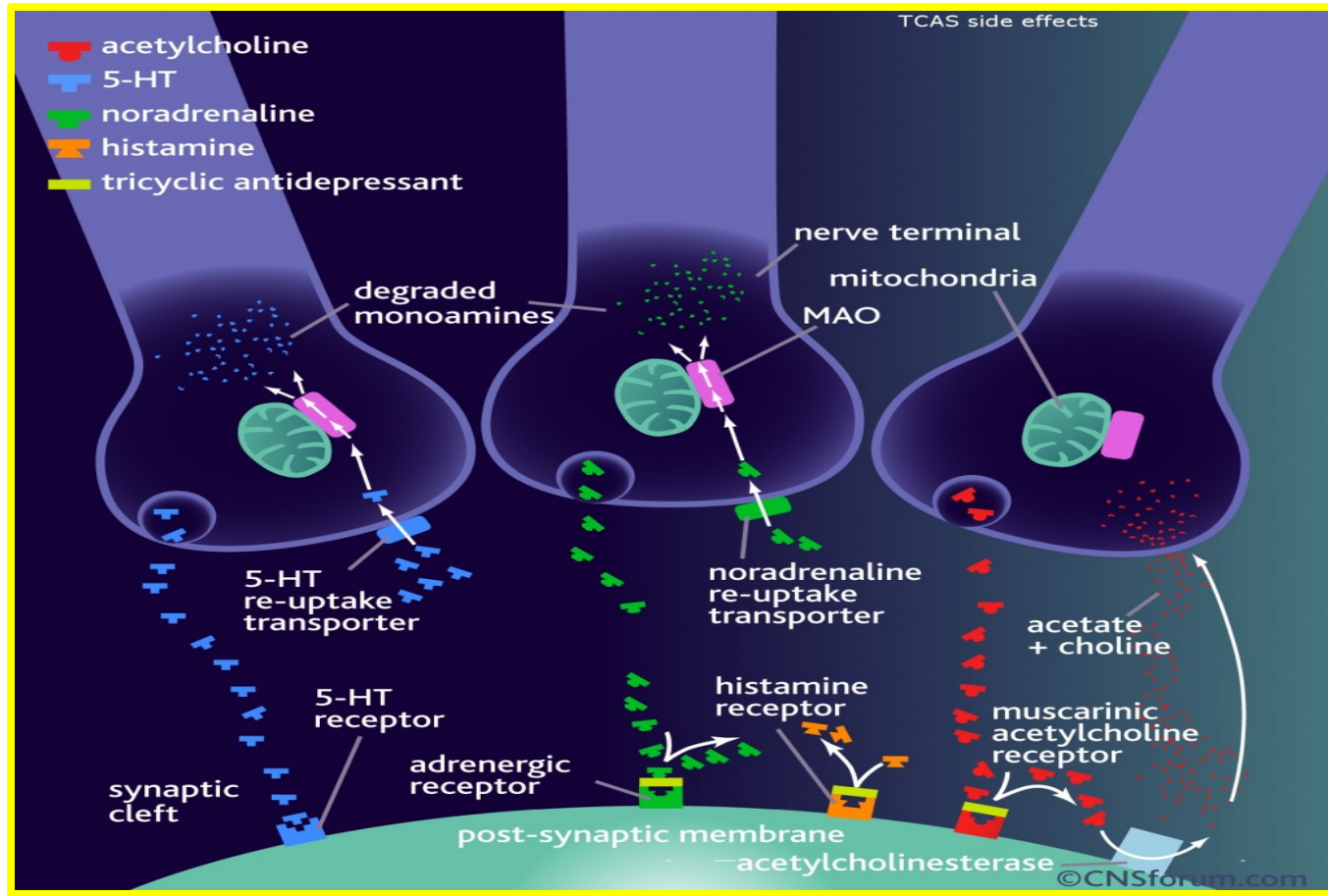
- **SNRIs (cont.)**
 - **Cymbalta** (Duloxetine) 30-60mg daily
 - **Effexor** (Venlafaxine) 37.5-75mg BID or TID
 - **Pristiq** (Desvenlafaxine) 50mg daily
 - Side effects: Insomnia, nausea, vomiting, diarrhea, seizures, HTN, heart arrhythmias, anxiety, agitation/aggression

Depression

- **TCA**s (Tricyclic/Tetracyclic Antidepressants)
 - Inhibits re-uptake of Norepinephrine, Serotonin and Histamine at the synapse
 - Anticholinergic effects which limit use in TBI population and is cause for most common side effects

Depression

TCA Mechanism of Action



Depression

- **TCA**s (Tricyclic/Tetracyclic Antidepressants)
 - **Elavil** (Amitriptyline) 50-150mg qhs
 - **Pamelor** (Nortriptyline) 50-150mg qhs
 - **Anafranil** (Clomipramine) 50-250mg qhs

Depression

- **TCA**s (Tricyclic/Tetracyclic Antidepressants)
 - **Side effects**: Memory loss, attention and concentration deficits, sedation, confusion, delirium, hypotension, urine retention, constipation
 - Used mostly in TBI population for sleep disorders, not depression

Depression

- “Novel” Group
 - **Wellbutrin** (Bupropion) 50-150mg BID
 - Inhibits reuptake of serotonin, norepinephrine and dopamine at nerve synapse
 - Useful for depression and attention/concentration deficits
 - Side effects: anxiety, insomnia, seizures, hallucinations
 - **Remeron** (Mirtazapine) 15-30mg qhs
 - Used mostly for sleep disorders and poor appetite
 - **Trazodone**
 - Used predominately for sleep disorders

Anxiety

- Definition: psychological disorder presenting as feelings of fear, uneasiness and/or restlessness
 - Situational or Generalized
- Commonly accompanies depression as a clinical syndrome

Anxiety

- **Situational**
 - Panic disorder usually triggered by an external stimulus
 - Crowded areas such as malls, grocery stores, events, etc...
 - Includes social phobias, OCD and PTSD
- **Generalized**
 - Constant feeling of tension, uneasiness, fear

Anxiety

- **Generalized**
 - SSRIs
 - Paxil 10-40mg daily
 - Celexa 10-40mg daily
 - Lexapro 10-20mg daily
 - Zoloft 50-150mg daily
 - Beta-blockers
 - Propranolol 20-60mg BID or TID - scheduled

Anxiety

- **Situational**
 - Anxiolytics
 - Short Acting (half-life 8-10 hours)
 - **Xanax** (Alprazolam) 0.25-1mg TID prn
 - **Serax** (Oxazepam) 10-30mg TID
 - Medium acting (half-life 10-14 hours)
 - **Ativan** (Lorazepam) 2-6mg/day divided BID or TID prn
 - **Estazolam** 1-2mg qhs prn

Anxiety

- **Situational**
 - Anxiolytics (cont.)
 - Long Acting (half-life 20-40 hours)
 - **Klonopin** (Clonazepam) 0.5-5mg TID
 - **Valium** (Diazepam) 2-10mg BID to TID
 - **Dalmane** (Flurazepam) 10-30mg qhs
 - Non-Benzodiazepine
 - **Vistaril** (Hydroxyzine) 25-50mg TID
 - **Inderal** (Propranolol) 10-30mg TID
 - Used mostly on an as needed basis

Anxiety

- **Side effects**
 - Benzodiazepines (all classes)
 - Lethargy, Drowsiness, Dizziness, Confusion, Delirium, Ataxia, Potential for abuse/addiction, Respiratory depression
 - Vistaril
 - Dry mouth, dizziness, lethargy, drowsiness
 - Inderal
 - Drowsiness, hypotension, bradycardia, depression

Agitation

- A psychological state manifested by verbal and/or physical aggression or rage
- Usually caused by an external trigger, but not always
- **Must identify what is causing the agitation in order to treat it effectively**
 - **Commonly not mood instability but rather an underlying anxiety disorder, sleep disorder or depression**
- Physiologically is a state of sympathetic overdrive and/or excessive dopamine
- Treatments are aimed at controlling these physiologic changes

Agitation

- **Treatments**
 - Mood Stabilizers
 - Depakote 250-1500mg BID
 - Tegretol 100-400mg BID
 - Atypical Antipsychotics
 - Risperdal 1-3mg BID
 - Seroquel 50-200mg BID
 - Zyprexa 5-20mg at night
 - Geodon 20-80mg BID

Agitation

- **Treatments**
 - Typical Antipsychotics
 - Haldol
 - Thorazine
 - Compazine
 - These agents should NEVER be used for maintenance therapy in brain injury patients
 - Evidence of delayed and incomplete cognitive recovery
 - Tardive Dyskinesia

Agitation

- **Treatments**
 - Maintenance therapy (cont.)
 - Beta-blockers
 - Propranolol 20-60mg BID or TID
 - Anxiolytics
 - Hydroxyzine 50-100mg TID
 - Clonazepam 1-3mg BID
 - Antidepressants
 - SSRIs
 - Neurostimulants
 - Ritalin, Adderall, Concerta, Strattera

Sleep disorders

- Difficulty with initiation, maintenance or both
- Must take a thorough history in order to treat sleep problems effectively
 - Night time routines
 - Caffeine intake
 - Napping during the day
 - Headaches
 - Awakening due to other medical problems
 - Pain, Urination, muscle spasms

Sleep disorders

- Treatment
 - First line is environmental changes
 - “Settling down” period at night
 - Relative dark environment with little/no noises
 - No caffeine after 7pm
 - If headaches are associated, may need to get a sleep study
 - Spouse/significant other reports patient snores excessively
 - Treat any underlying medical problem that is contributing

Sleep disorders

- Treatment
 - Initiation only problem
 - Brain can't "shut down" at night
 - Once patient can get to sleep they can stay asleep for 6-8 hours
 - **Melatonin**
 - » 3-6mg at night about an hour prior to wanting to go to sleep
 - **Trazodone**
 - » 50-150mg at night

Sleep disorders

- **Treatment**
 - Maintenance or combined problem
 - Patients have difficulty getting to sleep and staying asleep....OR....can get to sleep fine, but have trouble staying asleep
 - Awaken 5-7 times per night
 - Again....must treat any underlying medical cause

Sleep disorders

- **Treatment**
 - Maintenance or combined problem
 - Medications
 - Restoril (Temazepam) 15-30mg at night
 - Ambien 5-10mg at night

Sleep disorders

- Side effects
 - **Melatonin**: nightmares, sleepwalking, headaches
 - **Trazodone**: headaches, dizziness, nausea, vomiting, dry mouth
 - **Restoril**: drowsiness, fatigue, “hangover” effect, dizziness
 - **Ambien**: sleepwalking, night terrors, hallucinations, dizziness, lethargy, “hangover” effect

Attention deficits

- Inability to maintain focus and concentration on visual or auditory tasks
- Common with Frontal and/or Temporal lobe injuries
- Physiologically is a deficiency in the dopaminergic and/or noradrenergic pathways
- Can be associated with or without a hyperactivity component
- Again, a thorough history needs to be taken before any agent should be started
 - Heart disease (personal or family), seizures, sleep disorders, psychosis

Attention deficits

- Clinical presentations
 - Poor memory
 - Agitation
 - Frustration
 - Irritability
 - Tangential speech
 - Restlessness (hyperactive)

Attention deficits

- **Treatment**
 - Neurostimulants
 - **Ritalin** – blocks the re-uptake and increases the release of Norepinephrine (and some Dopamine) at the synaptic terminal
 - 5-20mg every morning and noon
 - Side effects: Agitation, hallucinations, mania, hypertension, tachycardia, anorexia. Anxiety, insomnia
 - **Adderall** – same as Ritalin but with less Dopamine effects
 - 10-20mg every morning and noon
 - Side effects: Same as Ritalin

Attention deficits

- **Treatment**
 - Dopaminergics
 - **Amantadine**: Increases the release of dopamine from the pre-synaptic membrane
 - 100-200mg every morning and noon (should not be taken after 3pm)
 - Side effects: Hallucinations, Seizures, Irritability, Anxiety, Insomnia
 - **Bromocryptine**: Blocks the re-uptake of dopamine from the synapse
 - 2.5-10mg every morning and noon (should not be taken after 3 pm)
 - Side effects: Same as Amantadine

Attention deficits

- Treatment (cont.)
 - Concerta and Strattera have not been well studied in TBI population and should be avoided unless necessary
 - Antidepressants
 - Wellbutrin 50-150mg BID

Summary

- Start low and go slow
- Change one thing at a time if possible
- Knowing side effect profiles and goals of treatment are vital
- Education is important
- Treat problems, not symptoms

Thank You!!

