Cannabis and Health

Module 11: Neurocognitive/Brain Disorders Part I

Lecture 4: Treatments for MS, Epilepsy, Traumatic Brain Injury

MS Treatment

- Treatment is focused shortening episodes, slowing he progression of the disease, and symptomatic relief
- Corticosteroids like prednisone are used to reduce inflammation during attacks
- Also a number of heavy hitting oral and injectable treatments
- For symptomatic relief, muscle relaxants, stimulants, and other medications for depression, pain, insomnia, etc.
- Most of the medications have highly undesirable side effects

Treatment of Epilepsy—Pharmacological Options

- Many anticonvulsant medications
- Used to decrease frequency and severity of seizures
- Some patients need to take more than one anticonvulsant at a time
- Anticonvulsant drugs can depress the abnormal brain activity that causes seizures
- Anticonvulsants can work even if doctors don’t know the specific cause of a patient’s seizures
- Around half of half patients newly diagnosed with epilepsy will become seizure-free with their first medication

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Common Drugs Used to Treat Epilepsy

Anticonvulsant Drugs

Seizure Type	First-Line Drug	Main Mechanism Site
Partial Seizures	Phenytoin Carbamazepine Valproate Lamotrigine Topiramate	Block Na Channel Inhibition of Na Channels GABA Receptor
Generalised Seizures		
Tonic-Clonic (*Grand Mal*)	Carbamazepine Valproate Lamotrigine Phenytoin	Block Na Channel
Myoclonic	Valproate Ethosuximide Clonazepam Levetiracetam	Block Na Channel Block T-type Ca Channel Block N-type Ca Channels
Absence	Ethosuximide Valproate	Block T-type Ca Channel Block Na Channel
Atonic	Valproate Lamotrigine Levetiracetam	Block Na Channel

Challenges of Medication Treatment

- Anticonvulsants can have significant negative side effects
  - Fatigue
  - Dizziness
  - Weight gain
  - Loss of bone density
  - Skin rashes
  - Loss of coordination
  - Speech problems
  - Memory and thinking problems
  - Depression
  - Suicidal thoughts and behaviors
  - Severe rash
  - Inflammation of certain organs, such as liver

- Anticonvulsants don't work to effectively control seizures for everyone

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Surgical Treatment of Epilepsy

- When medications fail to adequately control seizures, surgery is an option
  - remove area of brain that is causing seizures
  - this can be done if seizures originate in a small, well-defined area of brain
  - as long as area in brain doesn't interfere with vital functions such as speech, language, motor function, vision or hearing
  - surgery for epilepsy can cause complications such as altering cognitive ability
  - Some people still require medication to control seizures after surgery

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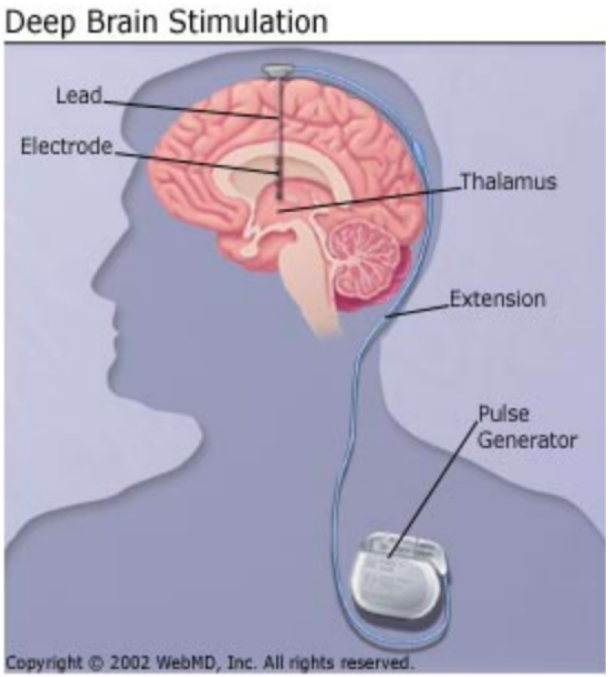
Other Therapies for Epilepsy

- **Vagus nerve stimulation**
  - device implanted in chest, sends electrical energy to brain
  - can usually reduce seizures by 20 to 40 percent.
- **Ketogenic diet**
  - diet high in fats and low in carbohydrates
  - can reduce seizures in children with certain types of epilepsy
- **Deep brain stimulation**
  - Electrodes implanted into a specific part of brain
  - Electrodes connected to a generator implanted in chest or skull that sends electrical pulses to brain and may reduce seizures



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TBI Treatment—Immediately After Injury

- For moderate to severe TBI
  - make sure the person has enough oxygen and adequate blood supply
  - maintain blood pressure
  - preventing further injury to the head or neck

- In Emergency Room or Intensive Care Unit:
  - focus on minimizing secondary damage due to inflammation, bleeding or reduced oxygen supply to brain
  - medications: diuretics, anti-seizure drugs, coma-inducing drugs
  - surgery: remove blood clot, repair skull fracture, stop bleeding in brain, relieve pressure in skull

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TBI Treatment: Rehabilitation

- Occupational therapist
- Physical therapist
- Speech and language pathologist
- Neuropsychologist
- Social worker or case manager
- Rehabilitation nurse
- Traumatic brain injury nurse specialist
- Recreational therapist
- Vocational counselor

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TBI Treatment: Mild TBI

- Mild TBI (e.g., concussion from playing sports) usually require no treatment other than rest and over-the-counter pain relievers to treat headache
- Close monitoring at home for any persistent, worsening or new symptoms
- Follow-up medical appointments
  - could involve CT or MRI scan
- Limit physical activity soon after injury
- Limit difficult cognitive tasks soon after injury
- Focus on “brain rest” and promoting healing

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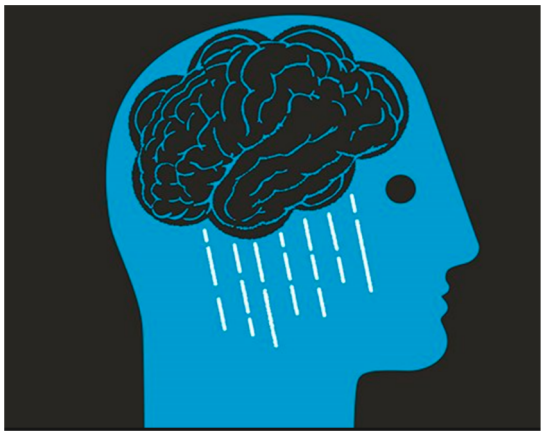
Treatment Complications: PTSD

- PTSD and TBI often coexist because brain injuries are often sustained in traumatic experiences
- Especially relevant for soldiers in Iraq and Afghanistan wars
- Differential Diagnosis
  - Significant overlap in symptoms of PTSD and TBI includes emotional numbing, derealization, reduced awareness of surroundings, depersonalization, and amnesia
- Many treatment challenges for people with TBI and PTSD
  - Uncertainty around events that happened when TBI was acquired can make PTSD treatment more challenging because PTSD treatments generally involve exposure to *memories* of the event

Bryant 2011, *Dialogues Clin Neuroscience*

Treatment Complications: Depression

- Depression is also highly comorbid with TBI and PTSD
  - TBI increases risk for developing depression
  - Some core symptoms of TBI and PTSD also seen in depression
    - concentration problems
    - memory problems
    - irritability
    - reduced motivation
    - fatigue



- Some the symptoms attributed to TBI may be generic symptoms of psychological distress

Bryant 2011, *Dialogues Clin Neuroscience*

Treatment Complications: Chronic Pain

- TBI, PTSD, and depression commonly occur in the context of **chronic pain**
- Chronic pain results in symptoms that overlap with each of these conditions
- Chronic pain more likely to be associated with severe TBI than mild or moderate TBI
  - Headache and musculoskeletal pain most common
- Pain after TBI may be related to neuroinflammation, neurodegeneration, or biochemical, molecular, epigenetic and/or synaptic changes in the brain

Bryant 2011, *Dialogues Clin Neuroscience;* Irvine & Clark 2017 *Pain Medicine*

Conclusions

- MS is a serious disease and not a lot is know about the causes, hence the treatments are not particularly effective
- MS treatments also have significant side effects
- There are a number of medications for epilepsy – though often effective they also have serious side effects
- PTSD, chronic pain, and depression/anxiety complicate treatment of TBI
  - Most of the treatments target symptomatic relief