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Spasticity
Is it Good or Bad?

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Disclosures

- Speakers Bureau for Allergan/AbbVie

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Objectives

- Describe spasticity and other movement disorders as they relate to traumatic brain injury
- Identify potential benefits of spasticity or emerging tone
- Delineate negative effects of spasticity and treatments aimed at tone

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What is spasticity?

- A velocity dependent increase in muscle tone associated with an exaggerated stretch reflex
- One component of the upper motor neuron syndrome
- Other components
  - Hyperreflexia
  - Weakness
  - Clonus

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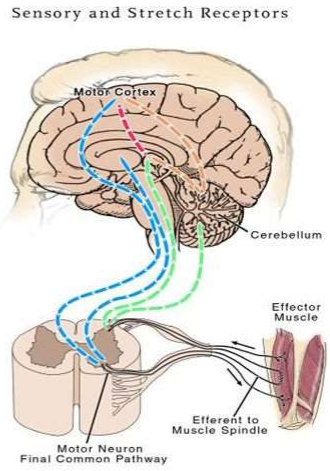
What Causes Spasticity?

Theory

- Imbalance between descending excitatory and inhibitory impulse to the alpha motor neuron:
  - Spasticity of cerebral origin results from lack of descending inhibitory input from subcortical nuclei in the brain
  - Spasticity of spinal origin results from interruption of descending tracts that inhibit or modulate alpha and gamma motor neurons



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What is not spasticity?

- Rigidity- a condition in which antagonist muscles both have increased tone causing difficulty with movement in all directions
- Dystonia- involuntary muscle contractions causing patterns of unwanted movements
- Other hyperkinetic movement patterns-
  - Ballismus
  - Choreaform movements
  - Athetosis

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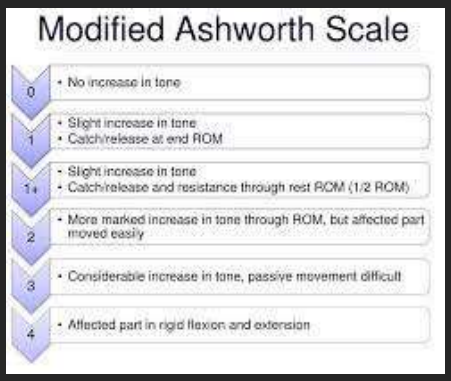
How to measure hypertonicity

- Used to supplement for measurement of spasticity
- Moderate interrater reliability
- Reliability depends on joints measured
- Within rater reliability is good
- Positioning is important
- Used as the measurement for most spasticity intervention studies



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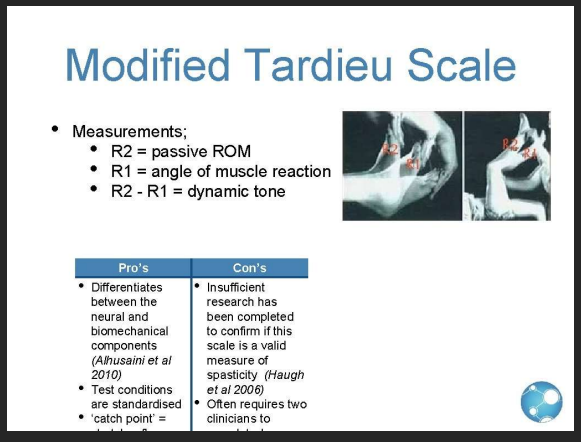
Other measurement options

- Modified Tardieu Scale
- Spasm frequency scale



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Key information in the history

- Language of spasticity
  - Tone, tightness, spasms, jumpy legs
- Sleep
- Pain
- Fatigue
- Functional status
- Caregiver information

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Important Functional Information

- How do you transfer?
- How do you get dressed? Upper extremities? Lower extremities? In bed or in chair?
- Do you wear splints? Really wear them?
- How do you use your impaired arm (for hemiplegics)?
- Do you have caregivers? What are their hours?

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Positive effects of spasticity

- Provides a solid grasp to put things in
- Provides tone in transfers
- Decreases muscle atrophy
- Potentially improves orthostasis
- May provide more UE movement then a flaccid toneless arm

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Negative effects of Spasticity

- Pain
- Can’t control limb when want to
- Skin issues
- Cannot tolerate bracing or positioning
- May impact sleep
- Makes it harder for caregiver to do tasks

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Treatment plan decisions

- What are the patient's goals?
- What are the family's goals?
- What can you achieve therapeutically?
- Need input from other sources
  - PT
  - OT
  - Paid caregivers

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Timing of management

- Acute
  - Patients change quickly
  - Goals need to be focused
- Subacute
  - Usually still involved with therapies
  - Patient/family still adjusting to illness
- Chronic
  - Role of contractures

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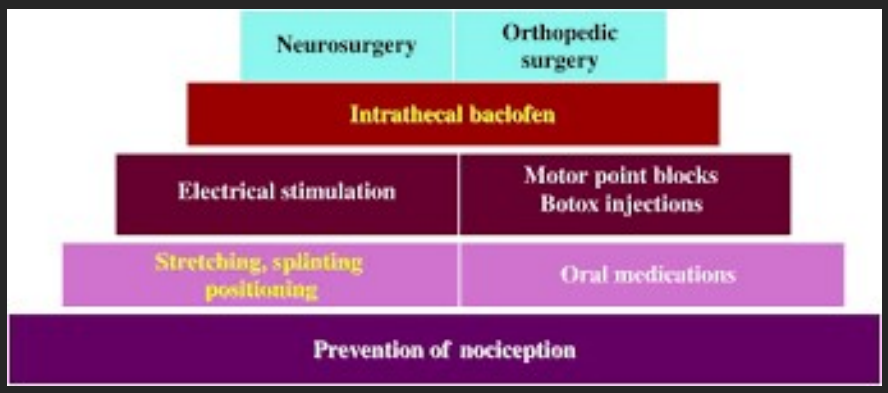
Theories of Spasticity Management



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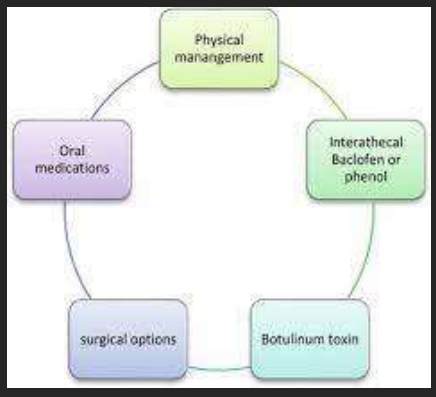
How We View It Now



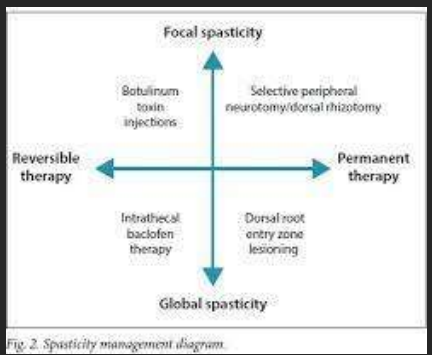


Fig. 2. Spasticity management diagram.

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Take Home Points

- It is not a mutually exclusive treatment plan
- What you do at one time may change as a patient changes
- You need to evaluate each intervention independently
- Reevaluate goals with patient and family periodically
- Need to take in to account psychosocial factors that may impact compliance- especially with ITB

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Oral Medications

- Baclofen- GABA-B agonist used to manage spasticity of spinal and cerebral origin
  - Depresses reflex transmission
  - Metabolized by liver/excreted by kidneys
  - Doesn't easily cross blood/brain barrier
- Dantrolene-direct acting skeletal muscle relaxant- interferes with calcium release from the sarcoplasmic reticulum
  - Metabolized by liver

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Oral Medications (cont)

- Tizanidine- Alpha-2 adrenergic receptor agonist causes presynaptic inhibition of excitatory neurotransmitters
  - Decreases heart rate and blood pressure
  - Metabolized by the liver, excreted by kidneys

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Neurotoxin injection

- Botulinum toxin A and B used to block acetylcholine release at the neuromuscular junction
- Commercially available as Botox, Dysport, Jeuveau, Xeomin, Myobloc, Neurobloc
- FDA indications for upper and lower limb spasticity in spastic hemiparesis

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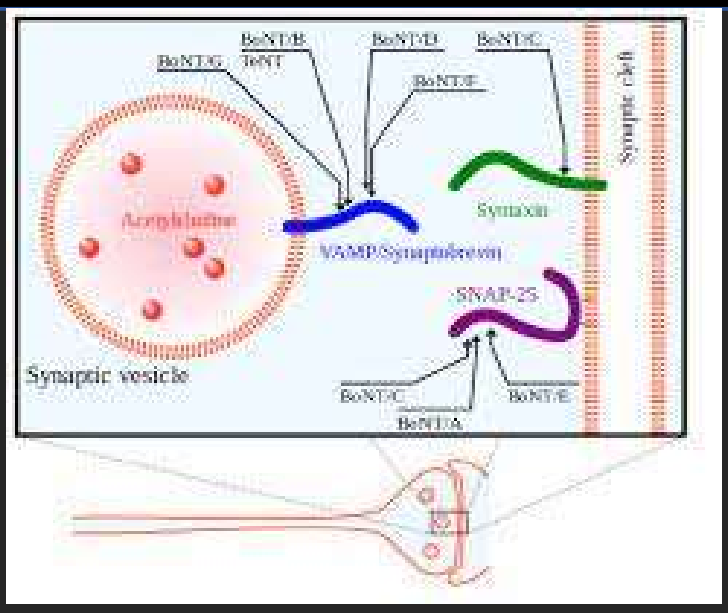

Courtesy of Wikipedia

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Advantage/Disadvantages of Neurotoxins

- Advantages
  - Work focally
  - Work quickly
  - Temporary
- Disadvantages
  - Cause weakness
  - Temporary
  - Difficult to treat large muscles
  - Cost

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Surgical Treatment of Spasticity

- Tendon releases/lengthening/muscle procedures
- Intrathecal baclofen pump
  - Powerful way to get baclofen past the blood brain barrier
  - Highest potential of weakness
  - Needs maintenance
  - Usually best for global tone management

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Intrathecal Baclofen Pump

Placed in the RLQ
Accessed with a spinal needle using a guidance template
Refilled every 2-6 months
Adjustable in the office

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Questions to Ask

- Temporary vs. Permanent tone reduction
- Interaction with other medical care
  - Always look at medical comorbidities before treating tone
- What else has changed
  - Seating and positioning
  - Splinting
  - Weight gain or loss
  - Sleep patterns

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Conclusions

- Use your resources- patients, families, therapists
- Develop a treatment plan
- Not all tone is bad

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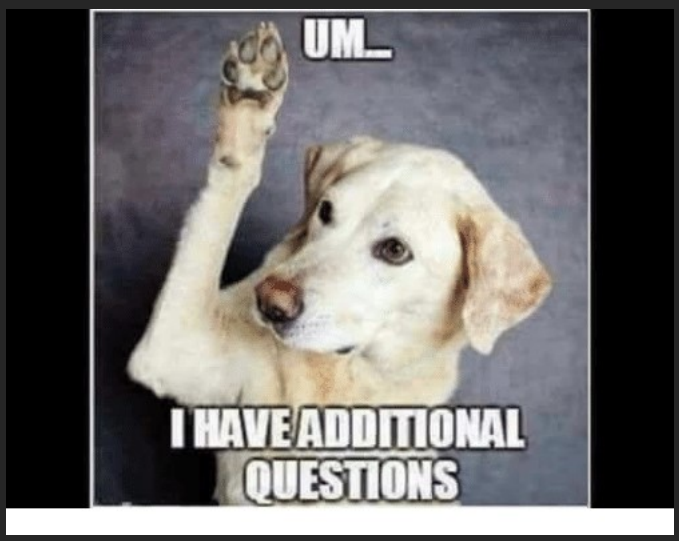
Questions????



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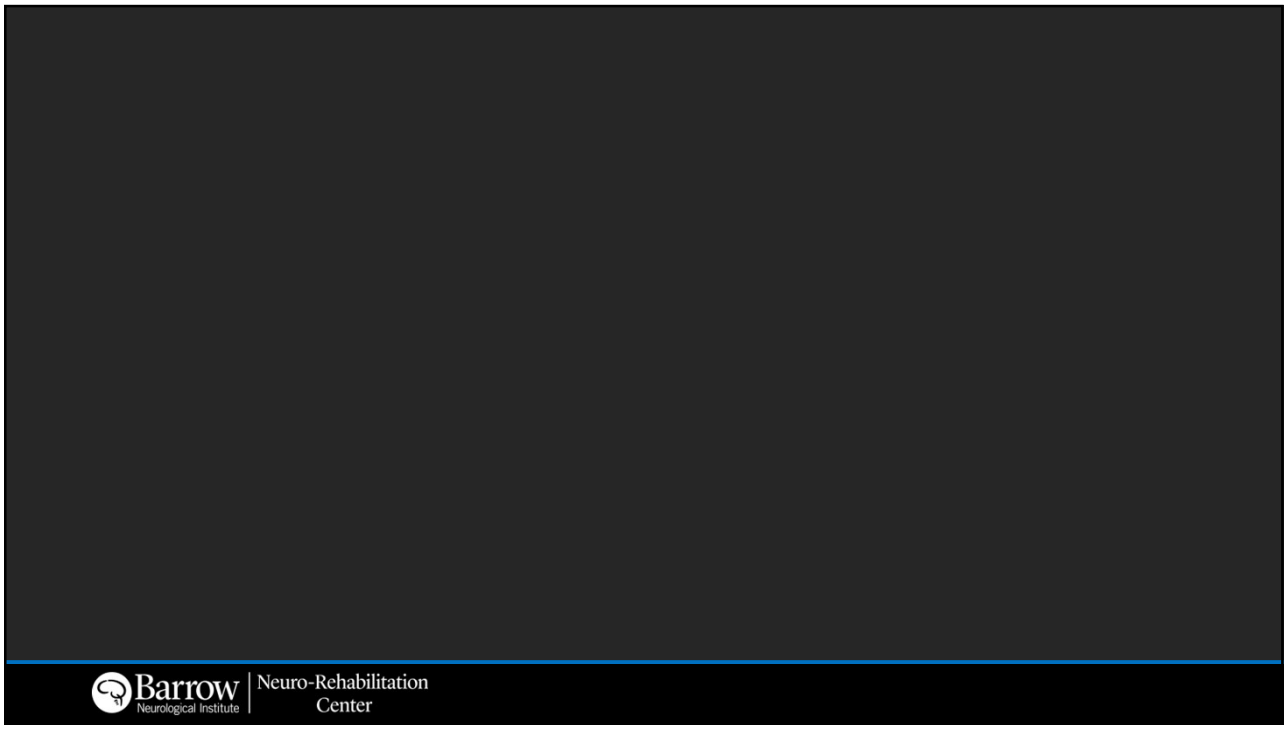
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