

Spasticity

Following a brain injury, you or your loved one may experience changes in muscle tone.

What is muscle tone? Muscle Tone is what gives your muscles shape. It is a state of tension that is present even at rest.

There are several different types of changes in muscle tone that can occur:

Hypotonicity- Less than normal muscle tone or tension. You or your loved one is not able to start or maintain enough muscle activity for the time it takes to complete an activity.

Flaccidity- Complete loss of muscle tone. You or your loved one is not able to start any movements with a flaccid muscle group.

Hypertonicity- Increased muscle tone or tension. You or your loved one is unable to stop increased muscle activity.

Spasticity- Increase muscle tone or tension which increases with increased speed during stretching. You will notice that there is less increase in you or your loved one's muscle tone when you try to stretch them slowly as compared to stretching quickly.

What causes these changes in muscle tone?

Changes in muscle tone that you or your loved one may experience are caused by an illness or injury involving the brain, brainstem or spinal cord, which make up the central nervous system. The central nervous system works as a network of nerves connected to the muscles to communicate complex information back and forth between the brain and the muscles.

Normally, this information follows easily allowing the body to move easily and adjust quickly without us having to think about it.

After an injury, this relay system can be disrupted and the brain may not be able to process this information in the right way. This causes the balance of the system to be disturbed which results in changes in muscle tone.

Changes in muscle tone can range from mild to severe and can happen in any of the muscles of the body from the tongue all the way down to the toes, involving one or both sides of the body and is very different for every individual

Common Symptoms

Changes in tone can vary dramatically from mild symptoms like the feeling of tightness in a muscle or may be severe enough to produce painful, uncontrollable spasms.

Changes in muscle tone are not always a bad thing. For example, having mildly increased tone in the muscles that help to bend your fingers may allow someone to maintain their grasp on a bottle while using the less involved hand to remove the cap.

In other cases changes in tone can interfere with mobility, self-care and positioning. For example, when someone has difficulty bending their hips to be able to sit in a chair or when a person lacks the necessary muscle tone to keep their arm on an armrest.

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When changes in muscle tone limit activity, it can cause additional medical problems including pain, sleep disturbance, joint problems, pressure sores, and pneumonia. Loss of muscle length and joint motion can lead to contractures making joints difficult or impossible to move making positioning and performing daily care more difficult. Additionally, decreased muscle tone can lead to increased and unwanted movement in a joint which can lead to painful positioning. This is commonly seen in the shoulder joint and is known as shoulder subluxation which can be very painful.

Changes in muscle tone affect everyone differently. Make sure to communicate with the medical team about how muscles are functioning and whether the muscle function is assisting with accomplishing a movement/task or preventing it from occurring.

How to Manage

Making decisions about treatment regarding changes in muscle tone require a team effort between the individual with tone changes, caregivers and health care professionals.

In order to help the healthcare team make the best decisions about treatment options make sure to track changes in muscle tone over time. It might be help to use the tracking tool below in the resource section to help you keep track of these changes over time.

It is important to keep in mind that some treatments are more appropriate for certain individuals depending on the underlying cause, severity, time since injury, medical stability, location, extent, prognosis, and speed of complication development. Treatment should be decided on a case by case basis and individualized to fit you or your loved one's symptoms and needs.

Treatment Options

Rehabilitation (Physical, Occupational and Speech Therapies)- Therapy for changes in muscle tone are designed to maintain or improve joint range of motion and mobility, increase strength and coordination and improve comfort.

- These interventions may include:
 - Stretching
 - Strengthening exercises
 - Splinting
 - Casting
 - Positioning
 - Applying hot or cold packs
 - Electrical Stimulation (E-Stim)
 - Weight bearing
 - Taping
 - Instruction and training for effective movement strategies
 - Instruction and training on use of assistive devices to improve safety and stability

Medications

The use of medications for treating changes in muscle tone should be discussed with your physician. All medications have potential side effects that should be weighed against the benefits of using them.

Medications can be given by mouth or feeding tube, intramuscularly (injected) and/or intrathecally (delivered directly in to the fluid surrounding the spinal cord).

Oral medications are generally most helpful for treating mild to moderate cases of spasticity. These medications circulated throughout the body and affect nearly all muscles. Side effects vary greatly by class of medication and patient.

The risks and benefits of using oral medications should be discussed with the health care team to determine appropriateness.

Common Oral Medications:

- Baclofen (Lioresal)
- Benzodiazepines (Valium, Klonopin)
- Dantrolene sodium (Dantrium)
- Imidazolines (Clonidine)
- Gabapentin (Neurontin)
- Tizanidine (Zanaflex)

Intramuscular injections

These may be used when the goal is to reduce increased tone and spasticity in a small number of muscle groups. These medications are delivered directly to the muscle being targeted and should not have the same widespread side effects like oral medications. These medications are desirable because of the length of relief they provide and limited side effects.

The effects of injections vary with dosing, muscle choices and severity of changes in muscle tone. The risks and benefits of using intramuscular injections should be discussed with the health care team to determine appropriateness.

Common Intramuscular Injections:

- Botulinum Toxin A (Botox)
- Botulinum Toxin B (Myobloc)
- Phenol/Alcohol

Intrathecal Therapy

Delivering medications intrathecally involves a surgery to put the pump in the abdomen and a tube that will deliver the medication from the pump directly into the fluid that surrounds the spinal cord.

Delivering medicines directly to the spinal fluid allows for a much more powerful reduction in increased muscle tone and spasticity and with fewer systemwide side effects.

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Baclofen is the most commonly used medication with intrathecal pumps but other medications may be used as well. The benefits and risks of Intrathecal Therapy should be discussed with your doctor and weighed carefully prior to initiating this regimen.

Other, more aggressive, medical interventions are also available. Please contact your physician for information on these other options.

Monitoring and Follow-up

Individuals with changes in muscle tone should have ongoing monitoring of their condition to assess changes that might indicate problems. If you loved one is not able to communicate pain, it is important to be aware that increase tone/spasticity can be the result of underlying medical issue which may include the following:

- Infections
- Increased fluid in the brain (hydrocephalus)
- Other medical complications (such as gastrointestinal issues)
- Medications used to treat spasticity have many side effects that can arise at any time, even after using the drug for a long time. These may include:
 - Dizziness
 - Sleepiness
 - Weakness
 - Fatigue
 - Bowel and bladder issues (such as not being able to go or unable to hold it)
 - Respiratory issues
 - Low blood pressure

****Please Contact your physician for any of these issues****