



# CEREBRAL PALSY



# Definition:

Cerebral palsy—also known as CP—is a condition caused by injury to the parts of the brain that control the ability to use muscles and bodies. It develops shortly before or during birth.

Cerebral means having to do with the brain.

Palsy means weakness or problems with using muscles and the body.

# Facts:

Cerebral palsy affects different body parts, so symptoms and severity can vary.

It does not improve or worsen during life; however, spasticity or other symptoms may become more prominent as a child grows and the nervous system develops.

Complications from the condition can cause additional health issues.

It occurs in one in every 300 children.





# Risk Factors:

## Prior to birth:

- Prematurity
- Intrauterine growth restriction
- Intrauterine infection
- Hemorrhage of mother shortly before birth
- Abnormalities of the placenta

## Acquired after birth (infancy and early childhood):

- Stroke
- Trauma
- Severe hypoxic events such as near-drowning
- Severe infections causing sepsis or meningitis

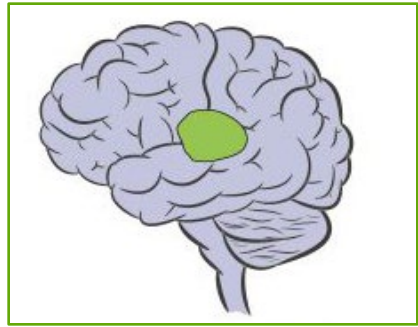


# T Y P E S



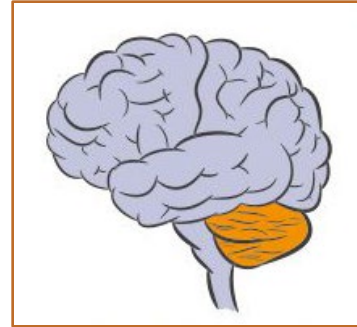
**SPASTIC:**  
Stiff muscles  
(spasticity)  
from damage  
to the:

**Cerebral  
Cortex**



**DYSKINETIC:**  
Uncontrollable  
movements  
(dyskinesia)  
from damage to:

**Basal  
Ganglia**



**ATAXIC:**  
Poor balance  
and  
coordination  
(ataxia) from  
damage to:

**Cerebellum**



**MIXED:**  
A combination  
of two or more  
types from  
damage to:

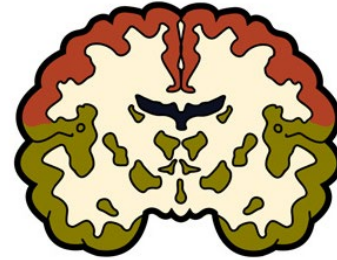
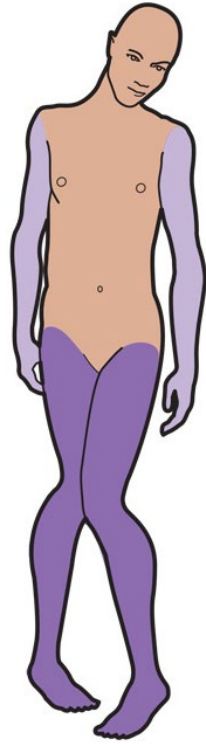
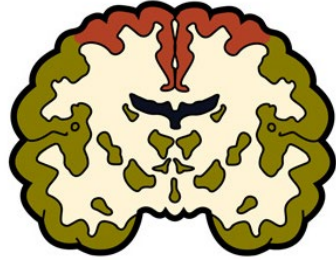
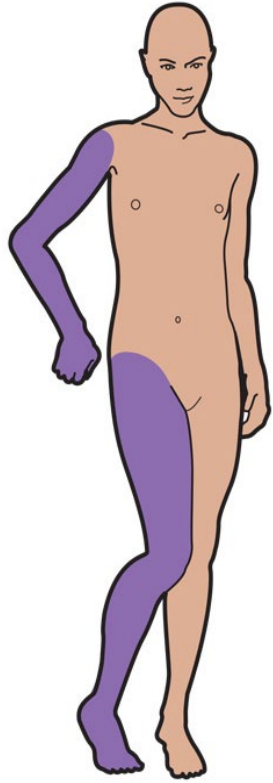
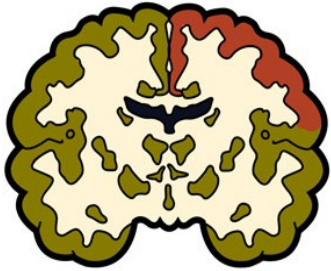
**Multiple  
brain areas**

# Spastic Cerebral Palsy

Someone with spastic cerebral palsy has increased muscle tone (spasticity).

- This is the most common form of CP affecting about 80% of individuals with CP.





# Spastic Cerebral Palsy Types:

Spastic Hemiplegia

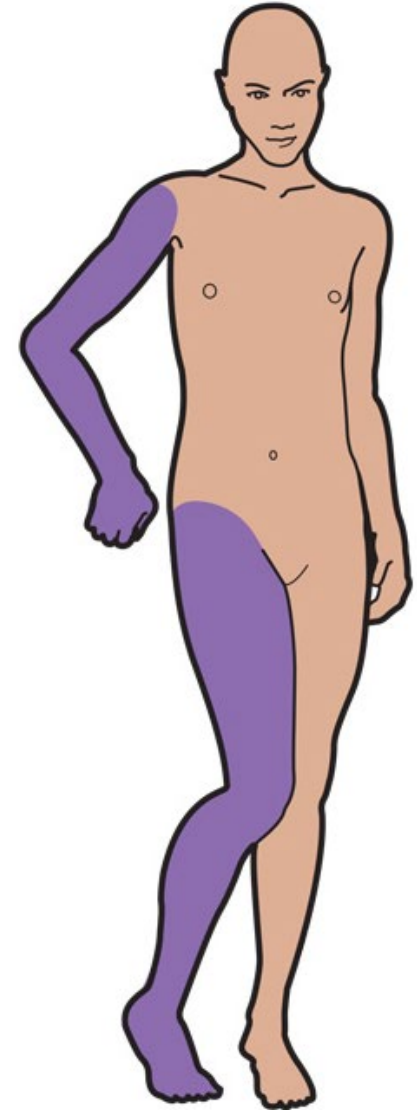
Spastic Diplegia

Spastic Quadriplegia

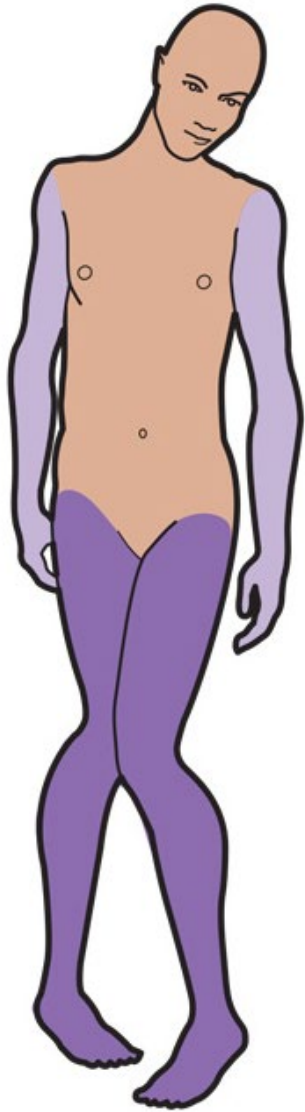
# Spastic hemiplegia:

Spastic hemiplegia/hemiparesis refers to asymmetric symptoms that predominate on one side of the body.

- ❑ The arm is typically more affected than the leg.
- ❑ The affected arm is usually held close to the body.
- ❑ The hand can be fisted.







# Spastic diplegia:

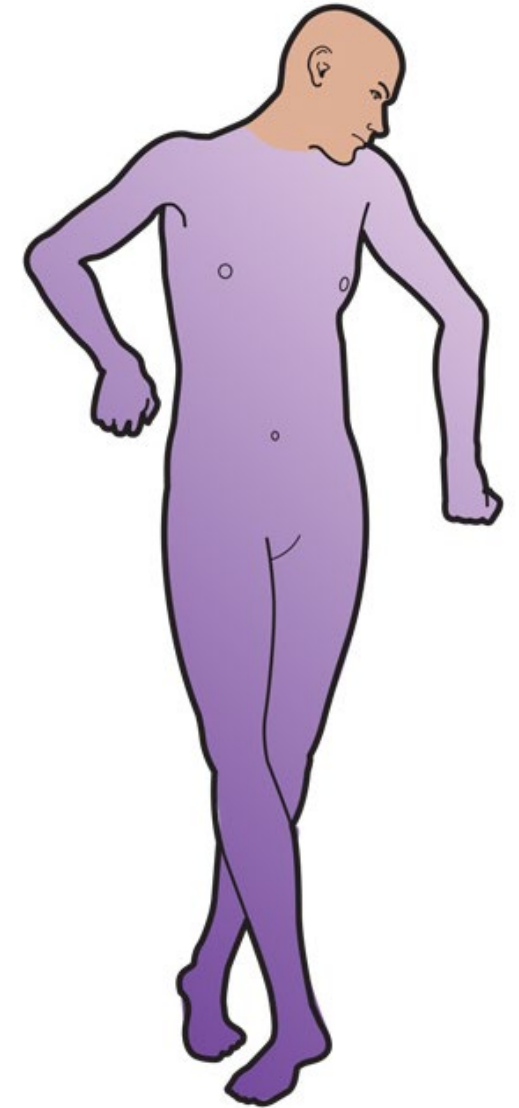
Spastic diplegia/diparesis consists of muscle tone or stiffness mostly in the legs with the arms less affected.

Walking can be an issue due to increased tone.

# Spastic quadriplegia:

Spastic quadriplegia/quadriparesis involves the arms, legs, trunk, and face.

- ❑ This can affect oral motor function such as speech and eating.
- ❑ Intellectual challenges and seizures are seen.
- ❑ Vision and hearing can be affected.
- ❑ Walking can be challenged.



# Dyskinetic Cerebral Palsy

Dyskinetic Cerebral Palsy involves issues controlling fast or slow movement of hands, arms, feet, and legs.

- ❑ The face and tongue may be involved.
- ❑ About 70% have lesions in varying locations throughout the brain.
- ❑ Activities such as sitting, walking, swallowing, and talking can be affected.



# Subsets of Dyskinetic Cerebral Palsy



Athetoid consists of involuntary movements anywhere in the body that can be hypertonic (very fast) or hypotonic (very slow). These speeds vary within the individual.

Choreoathetoid is a combination of sluggish movements mostly in the fingers and face and sudden movements especially in the fingers and toes.

Dystonic cerebral palsies are slow, rotational movement of the torso, arm or leg or combination of these body parts.

# Ataxic Cerebral Palsy

Ataxic Cerebral Palsy affects muscle coordination particularly in the legs and arms.

- ❑ It occurs in 5-10% of individuals with cerebral palsy.
- ❑ Can cause hypotonia (weak muscle tone), tremors, visual problems, and auditory (hearing) problems.



# Mixed Cerebral Palsy

## SPASTIC: 70-80%

Most common form.  
Muscles appear stiff and tight.  
Arises from Motor Cortex damage.

## DYSKINETIC: 6%

Characterised by involuntary movements. Arises from Basal Ganglia damage.

## ATAXIC: 6%

Characterised by shaky movements.  
Affects balance and sense of positioning in space.  
Arises from Cerebellum damage.

## MIXED TYPES:

Combination damage.

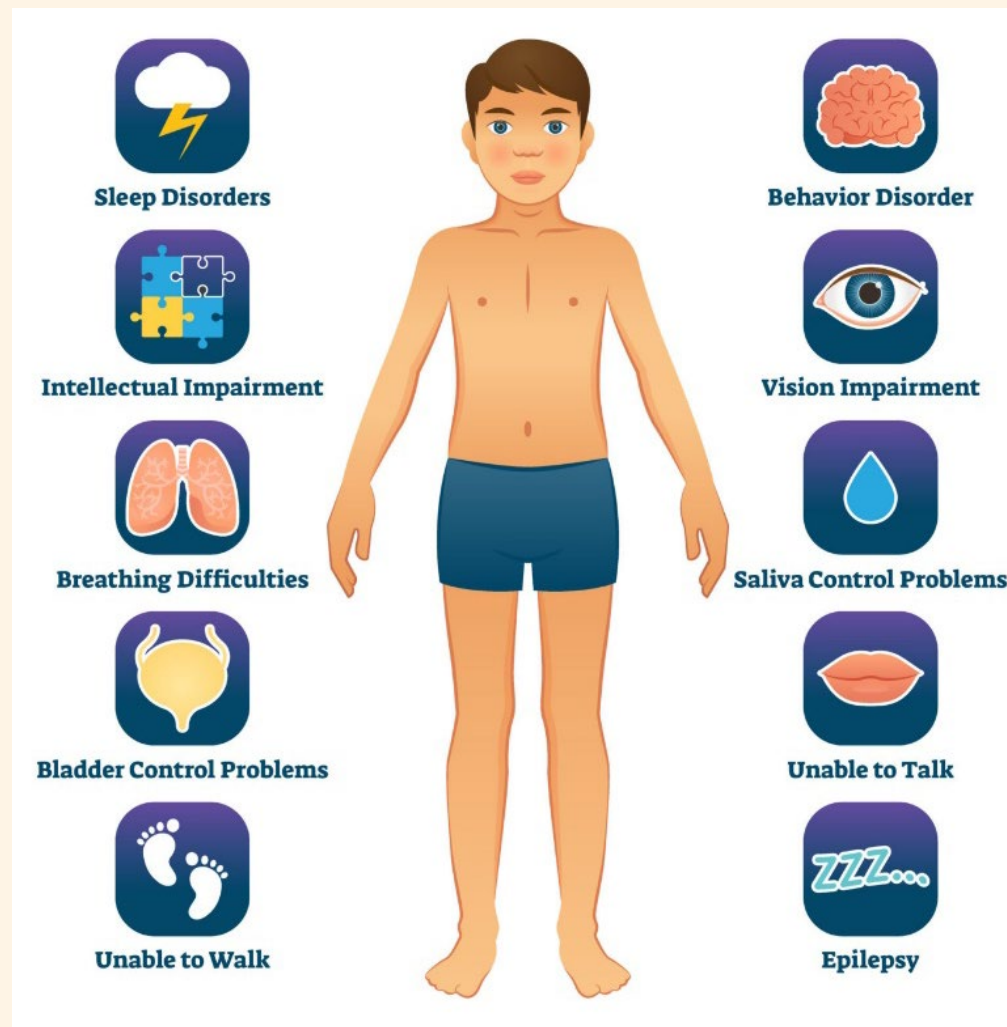
Mixed Cerebral Palsy is a combination of the other types of CP.

- The most common type of mixed CP is spastic and dyskinetic, but any combination is possible.

# Other disorders associated with cerebral palsy:

Associated cerebral disorders may affect cognition, vision, hearing, language, sensation, attention, and behavior.

Some individuals have epilepsy, and many have growth impairment or disturbed gastrointestinal function.



# Frequency of associated conditions:

Gastrointestinal disorders (90%)

Chronic pain (50 to 75%)

Intellectual disability (50%)

Speech-language disorders (40 to 60%)

Bladder control problems (30 to 60%)

Visual impairment (30 to 50%)

Epilepsy (25 to 45%)

Behavior disorder (25 to 40%)

Hip displacement (30%)

Sleep disorder (20%)

Drooling (20%)

Hearing impairment (10 to 20%)





# Associated conditions: Gastrointestinal disorders



As many as 90 percent of people with CP have clinically significant gastrointestinal symptoms, which may include:

- Chronic constipation (60 to 70%)
- Gastroesophageal reflux and/or vomiting (50%)
- Swallowing disorders (approximately 20%)

Gastrointestinal disorders may contribute to impaired nutrition and growth.

# Associated conditions:

## Chronic pain:

The most frequent causes of pain include:

- hip dislocation/subluxation
- dystonia
- gastroesophageal reflux
- constipation



## Sleep disorders:

Sleep disruption and poor sleep due to:

- abnormal circadian rhythms
- pain from various sources
- obstruction from abnormal airways
- hypoventilation from muscle weakness or a central etiology





# Associated conditions: Speech impairment

Disorders of speech and language, including apraxia, occur in 40 to 60% of children with CP and approximately 25% are nonverbal.

Apraxia is a disorder of the brain and nervous system in which a person is unable to perform tasks or movements when asked, even though:

- The request or command is understood.
- They are willing to perform the task.
- The muscles needed to perform the task work properly.
- The task may have already been learned.



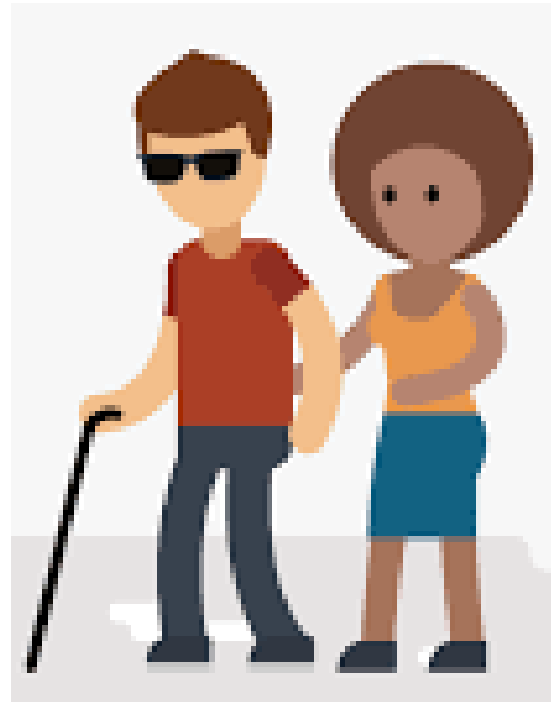
# Associated conditions: Bladder problems

Urinary conditions occur in 30 to 60% and include:

- Enuresis (incontinence)
- Frequency and urgency
- Neurogenic bladder



# Associated conditions: Vision and hearing impairment



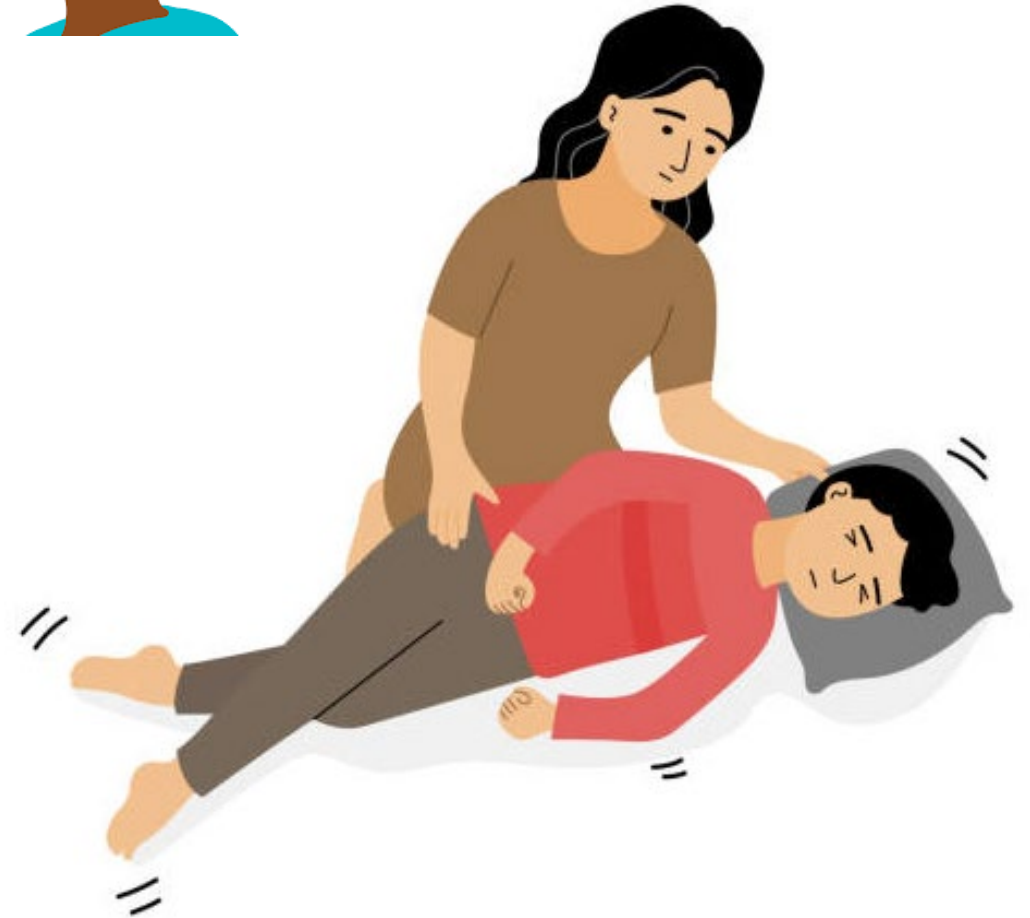
Vision problems occur in approximately one-third to one-half of people with CP, and approximately 10% are blind. Hearing impairment occurs in 10 to 20% and approximately 5% are deaf.

# Associated conditions: Seizure disorder

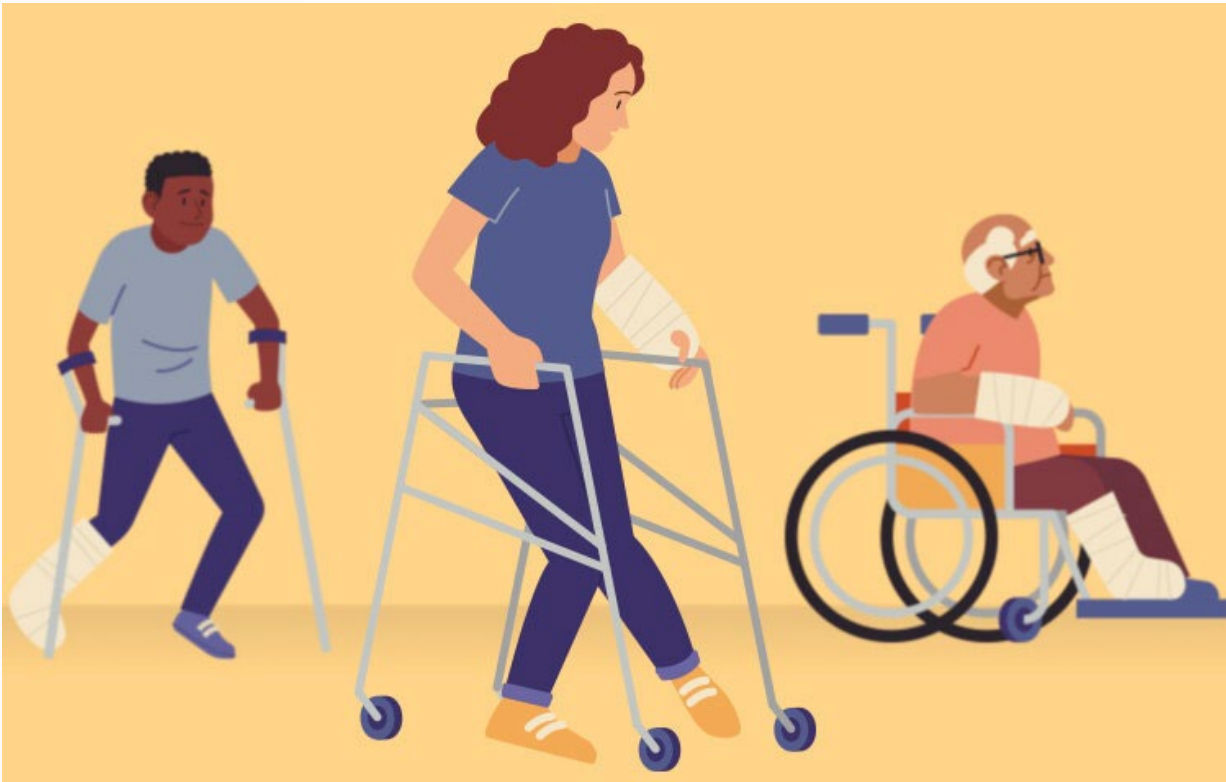
Epilepsy occurs in 25 to 45% of individuals.

Seizures are most common in those with spastic quadriplegic and hemiplegic subtypes.

Due to focal brain injury, focal seizures are the most common seizure type. These may develop secondary generalization.



# Associated conditions: Orthopedic



## Orthopedic disorders include:

- Contractures
- Hip displacement
- Foot and hand deformities
- Progressive neuromuscular scoliosis

## Osteopenia/osteoporosis:

- May result in frequent fractures
- Multiple factors contribute to the development of osteopenia, including lack of mobility, feeding dysfunction, nutritional deficiency, and chronic antiseizure medication use.

# Associated conditions: Pulmonary disease

Chronic pulmonary diseases are common and are a leading cause of morbidity and mortality among those with severe CP. Pulmonary disease results from different mechanisms that often occur together:

- ❑ Recurrent aspiration can occur because of chronic oropharyngeal dysphagia and/or GERD.
- ❑ Scoliosis and chest wall deformity are common and may contribute to restrictive lung disease.
- ❑ Weakness and/or poor coordination of the respiratory muscles may result in hypoventilation, ineffective cough, and poor clearance of pulmonary secretions.







# Associated conditions: Behavior disorders

Individuals with CP commonly have behavioral, emotional, and/or psychiatric disorders, including emotional lability, poor attention and vigilance, anxiety, depression, and obsessive-compulsive traits.

- ❑ Attention deficit hyperactivity disorder is frequently diagnosed with a reported prevalence of 25 to 40%.
- ❑ Features of autism spectrum disorder occur in up to 7% and at a higher frequency (up to 18%) in those with nonspastic CP



# Adults with CEREBRAL PALSY have:

**2x**

The risk of stroke



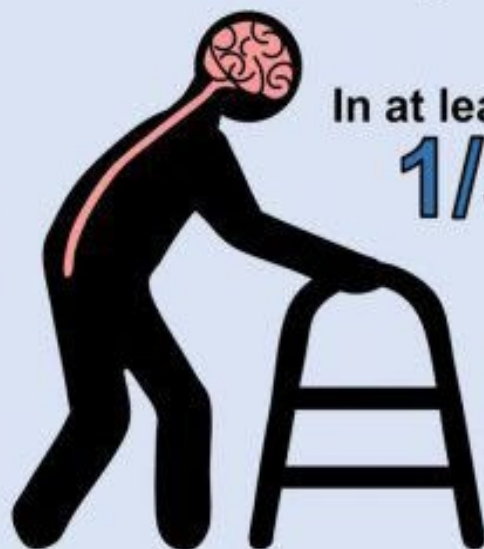
**8x**

The risk of myelopathy



Plus new symptoms with potential neurologic causes like:

Loss of mobility



In at least **1/3**

Chronic fatigue



In more than **65%**

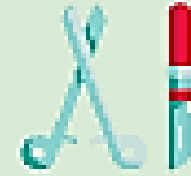
Chronic pain



In more than **60%**

# Treatment

There are various treatments used in cerebral palsy depending on the severity of symptoms including physical and occupational therapy, speech therapy, medications, surgery, and deep brain stimulation.



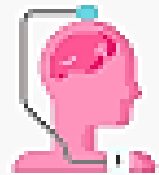
*Surgery*



*Medications*



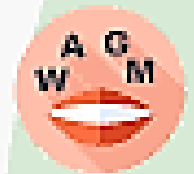
*Physical Therapy*



*Deep Brain Stimulation*



*Occupational Therapy*



*Speech Therapy*

# Treatment – PT/ OT



Physical therapy/occupational therapy:

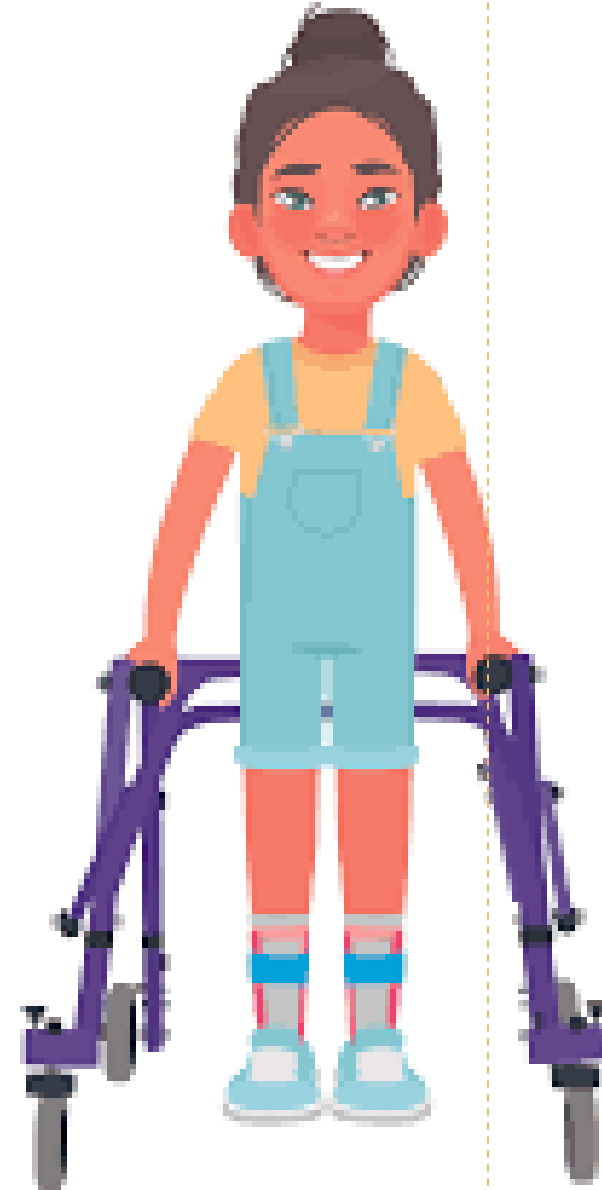
- ❑ PT has an important role in promoting range of motion, positioning, stamina, and coordination, all of which can directly impact mobility.
- ❑ OT is equally important and focuses on fine motor skill development and improving capacity for self-care. Targeted activities include skills such as feeding, toileting, dressing, personal hygiene, and fine motor tasks.

# Orthotics and other devices



Numerous devices are available to help promote function, mobility, and participation.

- Braces/orthotics
- Stenders
- Seating systems
- Mobility devices

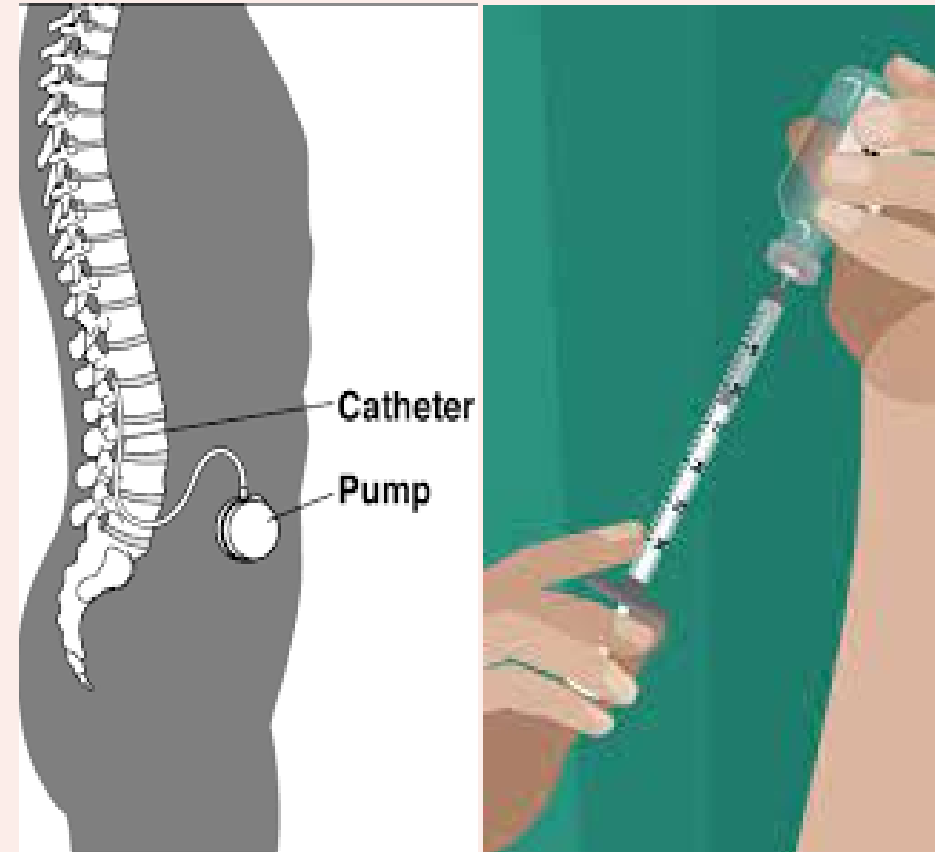


# Medications and surgery

## Spasticity

- ❑ Oral antispasticity drugs are often the first-line treatment.
- ❑ For treatment of localized or segmental spasticity, botulinum neurotoxin injections are used.
- ❑ Intrathecal baclofen pumps are used for severely affected individuals.

Various surgical techniques can be used for contractures and bony deformities.



# Prognosis

## Survival:

Most people with cerebral palsy survive into adulthood.

Life expectancy is generally lower than for the general population, though this depends on the severity of impairment.

Respiratory disease, often aspiration pneumonia, is the most common cause of death.





# Cerebral Palsy (CP)



Jean Justad, MD  
Medical Director, DDP  
2024