

# Cerebral Palsy

# Introduction

- The term cerebral palsy (CP) is an umbrella term for a group of permanent disorders of the development of movement and posture that cause activity limitations attributed to nonprogressive disturbances in the developing fetal or immature infant brain. The motor disorders of cerebral palsy are often accompanied by disturbances of sensation, perception, cognition, communication, and behaviour, caused by epilepsy and by secondary musculoskeletal problems

- Associated damage to one of more areas of the brain may lead to paralysis, spasticity, or abnormal control of movement or posture. Although the injury to the brain is considered static, the pattern of motor impairment changes over time, often affecting development in all daily occupations of childhood. The lesion or damage in the brain may cause impairment in muscle activity in all or part of the body.
- Cerebral palsy typically affects the development of sensory, perceptual, and motor areas of the central nervous system. As a result, the child has difficulty integrating the information that the brain needs to correctly plan and direct movements in the trunk and extremities that are used in everyday interactions with the environment. The muscles are activated in uncoordinated and inefficient ways and are unable to work together to create smooth, effective motion



# Prevalence and Etiology of Cerebral Palsy

- Cerebral palsy is the most prevalent cause of persistent motor dysfunction in children, with a prevalence of 1.4–2.1 per 1000 live births.
- The diagnosis of CP is approximately 1.5 times more common in males and is higher among non-Hispanic, African American children and children from low-to middle-income families. Approximately, 1 in 323 children have cerebral palsy in the United States.

- CP can result from the interaction of multiple factors, and in many cases, a single cause cannot be identified.
- Prenatal maternal infection, premature birth, low birth weight, and multiple pregnancies have been associated with cerebral palsy. Prenatal factors may include genetic abnormalities or maternal health factors such as stress, malnutrition, exposure to damaging drugs, and pregnancy-induced hypertension. Some gestational conditions of the mother, such as diabetes, may cause perinatal risks to the developing infant; prematurity and low birth weight significantly increase an infant's chance of acquiring a cerebral palsy diagnosis

- The origin of brain injury may occur during the prenatal, perinatal, or postnatal period, but evidence suggests that 70% to 80% is prenatal in origin. The nervous system damage that causes CP can occur before or during birth or before a child's second year, the time when myelination of the child's sensory and motor tracts and central nervous system (CNS) structures occurs rapidly.
- Medical problems associated with premature birth may directly or indirectly damage the developing sensorimotor areas of the CNS. In particular, respiratory disorders can cause the premature newborn to experience hypoxemia, which deprives brain cells of the oxygen needed to function and survive.

# Risk Factors Associated With the Development of Cerebral Palsy Prenatal

## Prenatal

- Genetic disorders
- Maternal health factors (e.g., chronic stress, malnutrition)
- Teratogenic agents (e.g., drugs, chemical exposure, radiation)
- Placental disruption (inability of the placenta to provide the developing fetus with oxygen and nutrients)
- Lack of growth factors affecting fetal growth in utero (e.g., hormones, insulin, proteins)
- RH blood type incompatibility between mother and infant

## Perinatal

- Prenatal conditions (e.g., toxemia secondary to maternal diabetes)
- Medical problems associated with prematurity (e.g., compromised respiratory and cardiovascular systems, intraventricular hemorrhage [IVH], periventricular leukomalacia [PVL])
- Multiple births
- Low birth weight



## Postnatal

- Severe and untreated jaundice shortly after birth
- Infections (e.g., meningitis, encephalitis, chorioamnionitis)
- Alcohol or drug intoxication transferred during breastfeeding
- Hypoxic ischemic encephalopathy (HIE): prolonged loss of oxygen during the birthing process
- Trauma during birth or shortly after

# Diagnosis

- A diagnosis of CP is made by a medical professional (e.g., general practitioner, paediatrician, paediatric neurologist). Best practice for diagnosis of CP involves a combination of assessments such as:
  1. Medical history concerning risk factors
  2. Neurological examination
  3. Standardized motor assessment
  4. Prechtl's General Movement for infants <4 months corrected (assesses quality of spontaneous movements)
  5. Developmental Assessment of Young Children for infants 6–12 months of age (parental questionnaire of volitional movements)
  6. Neuroimaging
  7. Ruling out of alternative diagnoses, including progressive disorders.



# Societal and Familial Costs

- Societal costs for persons diagnosed with CP are substantial, and estimates of total lifetime expenditures are estimated as high as \$11.5 billion.
- Average lifetime expenditure per child could exceed \$900,000 above the ordinary costs of raising a child. These costs can be due to several factors as families and specialists try to manage the secondary impairments that occur over the child's lifespan.



# Common Symptoms in Children With Cerebral Palsy

- Occupational therapists working with children with CP provide a variety of interventions to address children's participation in their desired occupations. Children with CP exhibit muscle tone abnormalities which present differently among but interfere with movement and occupational performance. Abnormal muscle tone affects posture, postural control and movement, and hand and upper extremity function. Secondary impairments develop over time and interfere with a child's performance in everyday activities. Children with CP may have difficulties with cognition and language, sensory functions, and feeding, eating, and swallowing.