Understanding the Different Types of Cerebral Palsy and Treatment Options

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Abstract

Cerebral palsy is caused by damage to the brain during or right after birth. The damage– caused by infections or reduced oxygen supply–may affect certain areas of the brain such as white matter or the motor cortex. These injuries to the brain may lead to abnormal muscle stiffness or strokes, which are major symptoms of cerebral palsy. The three fundamental types of cerebral palsy are spastic, dyskinetic, and mixed. Each have individual classifications of muscle stiffness. Physicians may prescribe anticonvulsants to combat seizures and benzodiazepines to reduce muscle spasms. Recently, new technological advancements have improved the lives of those with cerebral palsy such as Voicett, a talking device.

Introduction

In the United States, between 5,500 and 13,100 children are born with cerebral palsy each year (Cleveland Clinic, 2023). Cerebral palsy is a neurological disease that affects muscle movement. Since there is no test to diagnose someone with cerebral palsy, physicians have to use a combination of Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) scans, as well as neurological tests to determine if an individual has cerebral palsy. Many of the symptoms first appear in early childhood, such as having an abnormal gait, which is when individuals struggle with balance and coordination while walking. These motor impairments are mostly caused by damage to the brain. Further symptoms can arise such as seizure disorders, delayed growth and development, and impaired speech, vision, and hearing.

Causes of This Disease

There are many different causes of cerebral palsy. Birth complications and infections during pregnancy can be risk factors and causes of cerebral palsy. A child born prematurely, specifically before the 37th week of pregnancy, has a higher rate of developing cerebral palsy. Additionally, a baby with a low birthweight, less than 5 pounds and 8 ounces, has a higher rating of developing cerebral palsy (Centers for Disease Control and Prevention, 2025).

Various infections during pregnancy can increase the chance of developing cerebral palsy. For example, recent studies have connected cerebral palsy to chickenpox, rubella, and cytomegalovirus (Cleveland Clinic, 2023). These bacterial infections can infect the placenta causing the baby to be infected. Other infections can lead to a high amount of proteins, such as interleukin cytokines. A recent study conducted by Madison Paton, a researcher at Cerebral Palsy Alliance Research Institute, proved a link between specific cytokines such as IL-6 and IL-10, and cerebral palsy. These proteins are seen in high amounts for those with cerebral palsy. In a similar discovery, Dr. Mark R Schleiss, a pediatrician and researcher at the University of Minnesota, conducted a study finding the correlation between cerebral palsy and cytokines. Dr. Schleiss studied how interleukin cytokines are involved in neuroinflammation. They promote inflammation when the brain is injured through trauma or infections. Inflammation can lead to neuronal damage, causing motor development impairment, as seen in those with cerebral palsy (National Library of Medicine, 2021).

Brain Damage

Many different changes to the brain can cause cerebral palsy such as damage to white matter, cerebral dysgenesis, and intracranial hemorrhage (National Institute of Neurological Disorders and Stroke, 2025). White matter is a tissue in the brain full of a large network of axons, which aid in communicating to the rest of the body. It does this by passing down nerve impulses to neurons. Figure 1 shows six different newborns with acute to severe white matter injury. Patients D and F have low white matter, making them more likely to develop cerebral palsy. White matter can become injured by poor blood flow and nutrients,

causing ineffective communication throughout the body leading to abnormal motor development.

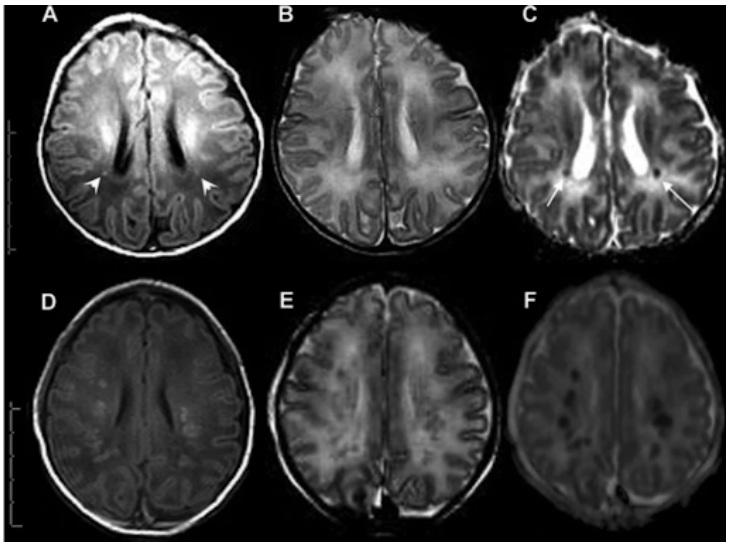

Figure 1. Patients A, B, C have relatively high amounts of white matter. Patients D, E, F have relatively low amounts of white matter, so they have a higher chance to develop cerebral palsy (Nature, 2009).

Cerebral dysgenesis is the abnormal development of the brain. These abnormalities can be caused by trauma, mutations, and infections. Intracranial hemorrhage is bleeding in the brain, commonly caused by a fetal stroke. Babies in the womb can experience a stroke when a blood clot occurs in the placenta. Damage to white matter, cerebral dysgenesis, and intracranial hemorrhage can all lead to abnormal motor development. This happens when areas of the brain that control motor function are affected.

Different Types of Cerebral Palsy

It is important to note that different types of brain damage can lead to various kinds of cerebral palsy. The three fundamental classifications of cerebral palsy are spastic, dyskinetic, and mixed (National Institutes of Health, 2021). Many medical professionals have discovered subclasses to spastic cerebral palsy, including diplegic and quadriplegic.

Spastic cerebal palsy is the most common type, and it is classified by extremely stiff muscles. Muscles can become abnormally stiff when damage is done to the motor cortex in the brain. The motor cortex controls muscles and movement, it can become injured by poor oxygen flow during or after pregnancy (Cleveland Clinic, 2025). One of the main subclasses of spastic cerebral palsy is diplegic. Individuals with diplegic cerebral palsy have stiffness only in the legs, as the arm and neck muscles are unaffected. Intellectual abilities are neurotypical, as well as speech abilities for diplegic cerebral palsy. Quadriplegic cerebral palsy is the second subclass of spastic cerebral palsy and it is the most severe. It is when the legs and arms are stiff, but neck muscles are extremely weak. For those with quadriplegic cerebral palsy speech is most likely impaired. Individuals may need assistance when eating and walking (Cleveland Clinic, 2023).

Dyskinetic cerebral palsy is a second type of cerebral palsy. It is the uncontrollable jerking movements of arms and legs. This is caused by damage to the basal ganglia in the neocortex, which is heavily involved in motor control (National Library of Medicine, 2023). For those with dyskinetic cerebral palsy, balance and motor skills may be abnormal. Facial muscles may also be affected, causing drooling. The last type of cerebral palsy is mixed. Mixed cerebral palsy is rare, and it is is a combination of spastic and dyskinetic.

Treatment Options

There are many great drug options for those diagnosed with cerebral palsy. Anticonvulsants are mainly to combat seizures and benzodiazepines are to reduce muscle spasms. Anticonvulsants work by decreasing the excessive electrical activity in the brain. This is done by altering the electrical activity of neurons. Neurons work by transmitting electrical and chemical signals to each other. When an individual has a seizure, neurons uncontrollably relay these signals. Anticonvulsants can inhibit certain ion channels, including sodium, potassium, chloride ion channels (Cleveland Clinic, 2023). Some of the more common anticonvulsants include topiramate, valproic acid, and phenobarbital.

Benzodiazepines are some of the oldest medical treatments to treat spasticity as seen in those with cerebral palsy. Benzodiazepines notify the brian to release more of a neurotransmitter called gamma-aminobutyric acid (GABA). GABA slows the nervous system down, creating a sedative effect on the body (Cleveland Clinic, 2023). In addition to medications, many new technological advancements have improved the lives of those with cerebral palsy. Voicett is an AI speech device for those with extreme speech impediments. The machine essentially “talks” for the patient with a click of a few buttons. Another great piece of technology is Stasism. Statism is a fun interactive way for children to complete physical therapy. The program utilizes games, sound effects, and colorful graphics.

Conclusion

Cerebral palsy can be caused from pregnancy implications or from brain injuries after birth. Damage to areas of the brain that control motor skills, vision, and speech can cause impairment. Multiple studies have been conducted on the correlation between interleukin cytokines and cerebral palsy (National Library of Medicine, 2021). Dr. Paton and Dr. Schleiss have conducted separate research on the correlation between interleukin cytokines and cerebral palsy. Cytokines are involved in neuroinflammation, where excessive inflammation can lead to neuronal damage, causing motor development impairment. Amount of white

matter is also a factor in developing cerebral palsy. White matter can be damaged through poor blood flow, inhibiting communication to the rest of the body. However, there are many different types of cerebral palsy, caused by different levels of brain damage. Spastic, dyskinetic, and mixed are the main types each effecting different parts of the body. Medical professionals have been utilizing anticonvulsants and benzodiazepines to treat seizures and spacity, respectively. Many more pieces of technology and medications are yet to be invented to better improve the lives of those with cerebral palsy.

References:

1. Figure 1 - Li, A. M. (n.d.). White Matter Injury in Term Newborns With Neonatal Encephalopathy. Nature. https://www.nature.com/articles/pr200915

2. Risk Factors for Cerebral Palsy. Center for Disease Control . (2025, February 24). https://www.cdc.gov/cerebral-palsy/risk-factors/index.html

3. Mayo Foundation for Medical Education and Research. (2023, September 28). Cerebral palsy. Mayo Clinic. https://www.mayoclinic.org/diseases-conditions/cerebral-palsy/diagnosis-treatment/drc-20354005

4. Cerebral palsy: A variety of causes, effects and treatments. Cleveland Clinic. (2025, March 19). https://my.clevelandclinic.org/health/diseases/8717-cerebral-palsy

5. 3 new technologies to assist people with cerebral palsy. Focus Care. (n.d.). https://focuscare.com.au/blog/3-new-technologies-to-assist-people-with-cerebral-palsy#:~:text=Voiceitt%20is%20an%20innovative%20speech,impairments%20to%20communicate%20more%20effectively.

6. U.S. Department of Health and Human Services. (n.d.). Cerebral palsy. National Institute of Neurological Disorders and Stroke. https://www.ninds.nih.gov/health-information/disorders/cerebral-palsy

7. Medications for cerebral palsy - helping manage symptoms. Cerebral Palsy Guide. (2024, July 9). https://www.cerebralpalsyguide.com/treatment/medications/

8. Elsevier. (2016, May 29). Automated, quantitative measures of grey and white matter lesion burden correlates with motor and cognitive function in children with unilateral cerebral palsy. NeuroImage: Clinical. https://www.sciencedirect.com/science/article/pii/S2213158216300948

9. U.S. Department of Health and Human Services. (n.d.). What are the types of cerebral palsy?. Eunice Kennedy Shriver National Institute of Child Health and Human Development. https://www.nichd.nih.gov/health/topics/cerebral-palsy/conditioninfo/types

10. Antiseizure medication. Cleveland Clinic. (2025a, March 19). https://my.clevelandclinic.org/health/treatments/24781-antiseizure-medications-anticonvulsants

11. Benzodiazepines: What they are, uses, Side Effects & Risks. Cleveland Clinic. (2025b, March 19). https://my.clevelandclinic.org/health/treatments/24570-benzodiazepines-benzos

12. Schleiss, M. R. (2021, April). Altered cytokine responses in children with cerebral palsy: Pathogenesis and novel therapies. Developmental medicine and child neurology. https://pmc.ncbi.nlm.nih.gov/articles/PMC8173757/

About the Author

Leah Rupp is a freshman at the University of Illinois in Urbana-Champaign studying Molecular and Cellular Biology within the honors concentration. Leah joined Brain Matters to get the opportunity to learn and write about new neuroscience research. Leah is also a Stress Management Peer with McKinley Health Center and a volunteer with the Food Assistance and Well-being Program. In her free time, Leah enjoys running and playing the piano. Her career aspiration is to become a physician.