



Cortical Visual Impairment (CVI)

What to know and how to support children with this brain-based visual impairment.



PCVIS
Pediatric Cortical Visual
Impairment Society



PCVIS.vision

What is Cortical Visual Impairment?

Cortical Visual Impairment (CVI) is a brain-based visual impairment. The eyes can see, but the brain has difficulty interpreting the visual world.

A Child Has CVI When

- An eye exam cannot fully explain their vision loss.
- They have a history of a neurological condition or brain injury, even if brain scans appear normal.
- They show specific visual and behavioral patterns identified in medical and educational research.^{1,2}

Individuals with CVI report that their vision can feel unreliable, like a kaleidoscope of shifting color and pattern.



The Brain, Not the Eyes

Ocular (eye-based) vision loss refers to how the eye works. CVI is about how the brain understands what the eye sees.

Routine vision exams may not find CVI, and many children with CVI have complex medical conditions that make it even harder to diagnose.³

A child's "functional vision," or how they use their vision in daily life, must be measured with a CVI-specific tool such as the CVI Range®, as a basis for interventions and support.²

There Is Hope for Improvement

The brain can change and form new pathways through neuroplasticity—and with the right supports, a child's functional vision can improve, unlocking learning and social potential.^{4,5}

Key Facts

CVI has become the leading cause of visual impairment in children in developed countries.

20–48%

of children with visual impairment in the U.S., U.K., and similar nations have CVI.^{6–9}

UP TO 44%

of children in India with vision loss are affected by CVI.¹⁰

UP TO 70%

of children with cerebral palsy are estimated to have CVI.¹¹

A Multidisciplinary Approach

Eye Health

Medical doctors—usually an ophthalmologist, neuro-ophthalmologist, or optometrist—can diagnose CVI after a complete eye exam. Children with CVI may also have coexisting ocular conditions, but they will not fully explain their functional visual difficulties.

Medical History

Children with CVI often have a neurological event or condition affecting the visual pathways of the developing brain, including lack of oxygen or blood flow to the brain, prematurity with periventricular leukomalacia, trauma, hydrocephalus, seizures, and genetic or metabolic conditions.¹

Behavioral Characteristics

Diagnosis also relies on unique behavioral and visual characteristics described in the CVI Range®.

Brain Imaging

While scans can support the diagnosis, some children will not have a visible neurological issue.¹²

Ongoing Follow-Up

Repeated evaluations can rule out other causes of vision loss, such as inherited disorders or delayed visual maturation.¹³ There are no direct medical treatments for CVI, but coexisting eye conditions should still receive care.¹⁴

Team Support

Doctors should understand CVI risk factors to enable early identification and referral. Teachers of Students with Visual Impairments (TVIs), Occupational Therapists (OTs), and orientation and mobility specialists (O&Ms) can collaborate to improve functional vision.



CVI Range® Assessment²

This is a valid and reliable educational assessment tool for youth with CVI that:

- Measures the impact of a child's brain-based visual impairment on everyday life.
- Provides a quantitative value, which offers the team a baseline so progress can be monitored and interventions designed accordingly.

Why CVI-Specific?

- Standard functional vision assessments measure impact and design interventions for individuals with ocular visual impairments.
- There are currently no standardized academic, neuropsychological, or developmental assessments for individuals with CVI.
- Guided by the child's CVI Range® score, teachers and therapists support learning, connection, and life skills—whatever the starting point.

References

- ¹ Chang MY, Merabet LB; CVI Working Group. Special Commentary: Cerebral/Cortical Visual Impairment Working Definition: A Report from the National Institutes of Health CVI Workshop. *Ophthalmology*. 2024 Dec;131(12):1359-1365.
- ² Roman-Lantzy C. *Cortical Visual Impairment: An Approach to Assessment and Intervention*, 2nd ed. New York: American Foundation for the Blind, 2018.
- ³ Lehman, S. S., Yin, L., Chang, M. Y., Section on Ophthalmology, & Council on Children With Disabilities; American Association for Pediatric Ophthalmology And Strabismus, American Academy of Ophthalmology; American Association of Certified Orthoptists (2024). *Diagnosis and Care of Children With Cerebral/Cortical Visual Impairment: Clinical Report*. *Pediatrics*, 154(6), e2024068465.
- ⁴ Bennett, C. R., Bauer, C. M., Bailin, E. S., & Merabet, L. B. (2020). Neuroplasticity in cerebral visual impairment (CVI): Assessing functional vision and the neurophysiological correlates of dorsal stream dysfunction. *Neuroscience and biobehavioral reviews*, 108, 171–181.
- ⁵ Handa, S., Saffari, S. E., & Borchert, M. (2018). Factors Associated With Lack of Vision Improvement in Children With Cortical Visual Impairment. *Journal of neuro-ophthalmology : the official journal of the North American Neuro-Ophthalmology Society*, 38(4), 429–433.
- ⁶ Kong, L., Fry, M., Al-Samarraie, M., Gilbert, C., & Steinkuller, P. G. (2012). An update on progress and the changing epidemiology of causes of childhood blindness worldwide. *Journal of AAPOS : the official publication of the American Association for Pediatric Ophthalmology and Strabismus*, 16(6), 501–507.
- ⁷ Teoh, L. J., Solebo, A. L., Rahi, J. S., & British Childhood Visual Impairment and Blindness Study Interest Group (2021). Visual impairment, severe visual impairment, and blindness in children in Britain (BCVIS2): a national observational study. *The Lancet. Child & adolescent health*, 5(3), 190–200.
- ⁸ Chong, C., McGhee, C. N. J., & Dai, S. H. (2019). Causes of childhood low vision and blindness in New Zealand. *Clinical & experimental ophthalmology*, 47(2), 165–170.
- ⁹ Solebo, A. L., & Rahi, J. (2014). Epidemiology, aetiology and management of visual impairment in children. *Archives of disease in childhood*, 99(4), 375–379.
- ¹⁰ Pehere, N. K., Narasaiah, A., & Dutton, G. N. (2019). Cerebral visual impairment is a major cause of profound visual impairment in children aged less than 3 years: A study from tertiary eye care center in South India. *Indian journal of ophthalmology*, 67(10), 1544–1547.
- ¹¹ Durkin, M. S., Benedict, R. E., Christensen, D., Dubois, L. A., Fitzgerald, R. T., Kirby, R. S., Maenner, M. J., Van Naarden Braun, K., Wingate, M. S., & Yeargin-Allsopp, M. (2016). Prevalence of Cerebral Palsy among 8-Year-Old Children in 2010 and Preliminary Evidence of Trends in Its Relationship to Low Birthweight. *Paediatric and perinatal epidemiology*, 30(5), 496–510.
- ¹² Sakki, H., Dale, N. J., Mankad, K., Sargent, J., Talenti, G., & Bowman, R. (2022). Exploratory Investigation of Brain MRI Lesions According to Whole Sample and Visual Function Subtyping in Children With Cerebral Visual Impairment. *Frontiers in human neuroscience*, 15, 765371.
- ¹³ Hoyt, C.S. Delayed visual maturation: the apparently blind infant. *Journal of the American Association for Pediatric Ophthalmology and Strabismus (JAAPOS)*, Volume 8, Issue 3, 215 – 219
- ¹⁴ Chang, M. Y., & Borchert, M. S. (2020). Advances in the evaluation and management of cortical/cerebral visual impairment in children. *Survey of ophthalmology*, 65(6), 708–724.



PCVIS
Pediatric Cortical Visual
Impairment Society

PCVIS is a 501(c)(3) nonprofit organization transforming outcomes for children with CVI by advocating for research, policy, education, practice, heightened awareness, and understanding of this brain-based visual impairment.

Visit [PCVIS.vision](https://www.pcvis.vision) for more information and resources.



[PCVIS.vision](https://www.pcvis.vision)