

## CORTICAL VISUAL IMPAIRMENT



### DEFINITION

Cortical Visual Impairment (CVI) is a temporary or permanent visual impairment caused by the disturbance of the posterior visual pathways and/or the occipital lobes of the brain. The degree of vision impairment can range from mild to severe visual impairment. The degree of neurological damage and visual impairment depends upon the time of onset, as well as the location and intensity of the insult. It is a condition that indicates that the visual systems of the brain do not consistently understand or interpret what the eyes see. The presence of CVI is not an indicator of the child's cognitive ability. The terms Cortical Visual Impairment, Neurological Visual Impairment, and Cerebral Visual Impairment, are sometimes used interchangeably.

### CAUSE

The major causes of CVI are asphyxia, perinatal hypoxia ischemia ("hypoxia": a lack of sufficient oxygen in the body cells of blood; "ischemia": not enough blood supply to the brain), developmental brain defects, head injury, hydrocephalus, and infections of the central nervous system, such as meningitis and encephalitis.

### CHARACTERISTICS

Initially, children with CVI appear blind. However, vision tends to improve. Therefore, Cortical Visual Impairment is a more appropriate term than Cortical Blindness. Most children show some recovery after being diagnosed with CVI but very few recover completely. Usually the most dramatic improvement happens in the first two years after the diagnosis. Improvement is related to children's brain plasticity, development and degree of neurological damage. A great number of neurological disorders can cause CVI, and CVI often coexists with ocular visual loss so the child should be seen by both a pediatric neurologist and a pediatric ophthalmologist. The diagnosis of Cortical Visual Impairment is a difficult diagnosis to make. It is diagnosed when a child has poor or no visual response and yet has normal pupillary reactions and a normal eye examination. The child's eye movements are usually normal, however nystagmus can be present in some children. The visual functioning will be variable. The result of an MRI (Magnetic Resonance Imaging) in combination with an evaluation of how the child is functioning visually, provide the basis for diagnosis.

## **BEHAVIORAL/VISUAL CHARACTERISTICS**

Children with CVI have different abilities and needs. The presence of and type of additional disabilities vary. Some children have good language skills and others do not. Sometimes selected neurological problems occur, such as spatial confusion or difficulty recognizing faces. Habilitation should be carefully planned. A full evaluation by a number of professionals is essential. The evaluation team could include: teachers (of the visually impaired or severely disabled), Physical Therapists (PT's), Occupational Therapists (OT's), Speech Therapists, and Orientation and Mobility Specialists.

### **Common characteristics of visual function demonstrated by children with CVI**

- Vision appears to be variable: sometimes on, sometimes off; changing minute by minute, day by day.
- Many children with CVI may be able to use their peripheral vision more effectively than their central vision.
- Some children with CVI are light sensitive; however others are attracted to light and can have difficulty switching their gaze to other visual targets, particularly right after the onset of CVI.
- Color vision is generally preserved in children with CVI (color perception is represented bilaterally in the brain, and is less susceptible to complete elimination).
- Frequently children with CVI can see color better than black and white. Some children with CVI show preference for specific colors while others show no such preference.
- Children may exhibit poor depth perception, influencing their ability to reach for a target.
- Vision may be better when either the visual target or the child is moving.
- A common characteristic of children with CVI is difficulty looking at faces for any length of time (lack of facial regard).

### **The behaviors of children with CVI reflect their adaptive response to the characteristics of their condition**

- Children with CVI may experience difficulty differentiating between background and foreground visual information ("crowding phenomenon").
- Close viewing is common to magnify the object or to reduce crowding.
- Rapid horizontal head shaking or eye pressing is not common among children with CVI.
- Overstimulation can result in fading behavior by the child, or in short visual attention span.
- The ability of children with CVI to navigate through cluttered environments without bumping into anything could be attributed to "blindsight", a brain stem visual system.
- Children are often able to see better when told what to look for ahead of time.

- Children with CVI may use their peripheral vision when presented with a visual stimulus, appearing as if they are looking away from the target.
- Some children look at an object momentarily and turn away as they reach for it.

## **MYTHS**

The following statements are NOT true, according to current knowledge in the field:

- All children with CVI will have cognitive deficits.
- Children with CVI are visually inattentive and poorly motivated.
- CVI is not a true visual impairment.
- Children whose visual cortex is damaged are Cortically Blind.
- Children with CVI are totally blind.

## **TEACHING STRATEGIES**

- The wide range of visual characteristics found in children with CVI makes keen observation of children's visual behaviors a crucial aspect of any intervention.
- Although they share a common diagnosis, children with CVI show a range of characteristics and thus teaching strategies need to be assessed considering the uniqueness of each infant. Strategies that work for some may not work for others.
- A great deal of energy is needed to process information visually. The child might tire easily when called upon to use his visual sense. Allow for intermittent "break" times.
- Positioning is important. Keep the child comfortable when vision use is the goal to ensure that "seeing" is the primary task.
- In some cases, head support should be provided during play or work sessions, to avoid involuntary shifting of the visual field.
- Try many different positions to find the one in which the child feels most secure. Infants and toddlers will demonstrate when and where they see best by their adaptive behaviors.
- The simpler, more constant and more predictable the visual information, the better the child with CVI is likely to perceive and process it. Keep toys and environment simple and uncluttered. Use books with one clear picture on a contrasting simple background.
- Use familiar/real objects (bottle, bowl, plate, bath toy, diaper, cup, spoon, favorite toy) one at a time. Familiarity and simplicity aids perception.
- Use bright and bold colors that the child prefers since color perception is often intact. Looking at colored mylar paper may help trigger visual responses.

- Repetition leads to familiarity, which encourages visual response. Use the same objects and same process each time to provide familiarity and security for the child. Be ready to expand upon routines whenever possible to avoid the child becoming fixated in non-productive repetitive behaviors.
- Look for toys and activities that motivate the child.
- Vision is often best stimulated when paired with another sensory system. For example, auditory cues from the handling of mylar may help attract the child's attention. However, if the child needs to use a lot of energy for fine motor tasks, work on fine motor and vision separately, until integration of the modalities is possible.
- Introduce new and old objects via touch and verbal description. Sometimes a child will be more likely to look at an object if he touches it first. Describing the object after asking the child to look at it can also encourage a visual response.
- Research has shown that many children with CVI are dazzled by very bright light. Regular ambient lighting might be most appropriate. However, this should be assessed on a case-by-case basis. Locate a light source behind, and/or to the side of the child in order to avoid glare and optimize viewing conditions.
- If the child is having difficulty seeing an object, add movement to it and/or present it in different areas of the child's visual field. However, be aware that some children with CVI have trouble looking at moving objects.
- Allow lots of time for the child to see and to respond to what is being seen.
- Learn to interpret each child's subtle response cues: such as changes in breathing patterns, shifts of gaze or body position, etc.

"When a child with CVI needs to control his head, use his vision, and perform fine motor tasks, the effort can be compared to a neurologically intact adult learning to knit while walking a tightrope."

## RESOURCES

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### **ACKNOWLEDGMENTS**

Julie Bernas-Pierce, Editor  
Janice Polizzi  
Colette Altmann  
Barb Lee  
Dr. Creig Hoyt

### **Home Counselors**

Dennak Murphy  
Dr. William Good  
Ann Silverrain  
Off to a Good Start Program

**The Pediatric Visual Diagnosis Fact Sheets are sponsored by a grant from the Blind Children's Center and with support from the Hilton/Perkins Program through a grant from the Conrad Hilton Foundation of Reno, Nevada.**

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