

# Development of Stereopsis Using Eyetronix Flicker Glass™ to Treat Amblyopia in Congenital Unilateral Post-Cataract-Surgery Aphake



Eric S. Hussey, OD, FCOVD Spokane, WA USA



Eyetronix Flicker Glass™

## Abstract

### Background

Early or congenital cataract is typically treated with early surgery, commonly without pseudophakic implants. Surgery is often followed with patching and optical correction, including extended wear contact lenses. Some level of amblyopia is expected to persist depending on how early surgery is performed and what post-surgical therapies are accomplished.

### Case Summary

As a parallel case study to the Eyetronix Flicker Glass™ Amblyopia Treatment Study, a 5-year old white female unilateral (post-surgical) aphake was treated with the novel therapy.

Eyetronix Flicker Glass™ are glasses with liquid crystal lenses that rapidly alternate occlusion between the two eyes at a prescribed “flicker” frequency. The subject had been previously fitted with an extended wear pediatric aphakic contact lens and had been faithfully patching for 4 hours daily.

In this case study, the subject wore Eyetronix Flicker Glass™ for near activities (e.g., coloring) for 1-2 hours daily for a 12-week treatment period. Given positive results and strong interest in continuing treatment by the subject, parents and doctor, therapy was extended for an additional 12 weeks.

Acuity in the amblyopic aphakic eye has improved from LogMAR 0.34 to 0.26. In addition, stereopsis has improved from <500 seconds (no response on stereo tests) to a reliable 63 arcseconds (Random dot 2).


In addition to being considered “a treat” compared to 4 hours daily patching, Eyetronix Flicker Glass™ therapy improved visual acuity and stereopsis beyond what had been attained with conventional patching. This novel therapy holds promise in treating early post-surgical aphakic amblyopia by improving binocular vision, improving visual acuity, and being well-accepted during use.

## A Little Girl’s Story



Subject was born in August 2008 with a congenital central cataract OD. From 4 months of age until she entered this case study at 5 years, her parents patched her faithfully 4 hours per day with absolute compliance.

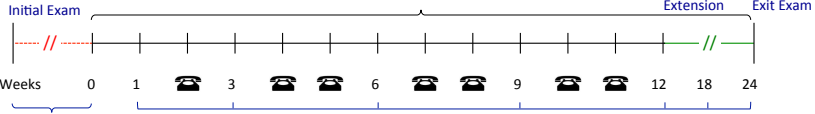
Surgery making the right eye aphakic was done in February 2010. She received two different soft contact lens powers, +20.00 and +23.00. These were worn (and continue to be worn) as extended wear. Patching continued. On examination in 2013, our subject’s acuity was a variable 20/50 OD. Her left eye continued as phakic seeing 20/20. She did not show measurable stereopsis on the Randot 2 test.

### SNAPSHOT

<b>Subject</b>	5 yr old female, congenital central cataract OD; post-surgery aphakic		
<b>Refractive Correction</b>	OD: 2 different extended wear soft CL, +20.00 and +23.00	OS: no correction	
<b>Prior Therapy</b>	Patching, 4 hours daily, age 4 months to 5 years with <i>absolute compliance</i>		
<b>Eyetronix Flicker Glass™ Therapy</b>	1-2 hours daily wear	Near work (unrestrictive) e.g., coloring	

<b>Baseline VA</b>	OD: variable 20/50 OS: 20/20 (phakic)		<b>Best Achieved VA</b>	OD 20/30- (amblyopic eye)
<b>Baseline Stereopsis</b>	Not measurable (>500 sec)		<b>Best Achieved Stereopsis</b>	Global 500 sec Local 63 sec
			<b>Compliance</b>	“Piece of cake”

## Eyetronix Story

Eyetronix was inspired by an extremely motivated parent of a toddler with strabismus and amblyopia. “Natalie” had already undergone surgery to correct her eye turn by age 1, with prospects of needing a second surgery, and her father was determined to find an alternative.

He noticed when he covered either eye, his daughter would look straight at him with the uncovered eye – and as he alternated which eye he covered, the other would automatically fixate on him. However, as soon as he uncovered both eyes, one eye would immediately turn.

As an engineer, he reasoned that a simple wearable device could be designed to provide rapid alternating occlusion at appropriate frequencies to help her sustain this fixation.

He approached a global manufacturer of active 3D glasses, and working together with a VT OD, an early prototype of Eyetronix Flicker Glass™ was born.

## Our Little Girl Meets Eyetronix

The protocol for the Eyetronix Flicker Glass™ Amblyopia Treatment Study was reviewed and approved by the New England College of Optometry IRB. A separate IRB approval was obtained to evaluate this aphakic subject as a case study. At 12 weeks, improvements were encouraging enough that the family and I sought an extension to see what further improvements we might gain. Extension was granted and an additional 12 weeks of therapy completed.

## Compliance and Results

**Acuity** improved as shown.

**Stereopsis** improved from not testable to fairly reliable 63 seconds local and a global response at 500 seconds.

At 12 weeks, our subject showed a **real-world stereo response** in reaching for a pitcher of milk. An excited Mom called us.

When asked about **compliance**, Dad’s response was “Are you nuts? Piece of cake compared to patching!”

### Changes with Eyetronix Flicker Glass Therapy



## Future

Together with the broader study of Eyetronix Flicker Glass™, presented at ARVO and during the COVD research session (Thursday, October 23, 8-9am), we are encouraged by our experience with this novel binocular approach.