



Research & Evidence for Convergence Problems

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The conditions of convergence insufficiency (CI, also called convergence weakness) and convergence fatigue means that a person's eyes have to work harder than normal to keep turning their eyes inwards (convergence) together to look at a book or electronic device. The effort to maintain convergence for long periods of reading or Ipad or Iphone use can in some people fatigue more quickly than normal, resulting in excessive effort to stop the print going blurry or double, which can show as eyestrain, headaches and watering eyes, as well as impaired attention (mind wandering easily) and poor comprehension (having to reread for meaning), as the brain's attention is diverted to working the eyes, and away from staying on task and remembering the information read. Sometimes people pull the book closer to make the print bigger, and make the eyes work harder, which makes the problem worse in time. Convergence problems are often connected to problems of maintaining and changing focus (accommodation fatigue and infacility).

Commonly, when convergence is tested by an optometrist, the ability to follow a target in towards the nose (normal is less than 10 cms from the nose) can be uncomfortable, the target can go blurry or even double further away than 10 cms,, and one eye will turn out as the eyes and brain give up. This may not happen on the first test, but with repeated testing (simulating sustained convergence), the focusing and convergence system will fatigue, with print blurring or doubling. Typically CI gets worse over time as the eyes increasingly struggle to cope with near visual demands.



Treatment

Treatment of convergence problems can often involve reading glasses for all close work, to treat associated focusing problems. If necessary, a period of vision therapy can improve the person's ability to maintain convergence without significant fatigue, eyestrain or blurred vision. Research and clinical experience have shown that in-office intensive vision therapy is the most effective type of vision therapy to treat convergence problems. Computerised vision therapy is not as effective alone, but can be useful as an adjunct to in-office therapy. Push up exercises (following your finger in towards your nose) can often be painful, and have conclusively been shown by research not to work.

A brief summary of references for convergence insufficiency

In 2008 co-authors of the CITT Investigator Group ¹ showed (in Archives of Ophthalmology) that twelve weeks of office based vergence/accommodative therapy with home reinforcement resulted in a significantly greater improvement in symptoms and clinical measures of near point of convergence and positive fusional vergence, and a greater percentage of patients reaching the predetermined criteria of success, compared with home-based pencil push-ups, home-based computer vergence/accommodative therapy and pencil push-ups, and office based placebo therapy.

Westmanna & Liinamaa (2012)² studied 135 patients and concluded that, "With orthoptic exercises it is possible to achieve longstanding relief of the symptoms of CI."

Serna et al (2011, J AAPOS)³ were able to demonstrate that home-based computer based therapy reduced symptoms and improved near point convergence and fusional amplitudes; and that this is an effective option for treating symptomatic convergence insufficiency.



McGregor (2014)⁴ states, “There is consensus among eye care professionals that convergence therapy is effective in treating convergence insufficiency.”

Sreenivasan and Bobier (2015)⁵ showed that the reduced vergence adaption and excessive convergence accommodation found in convergence insufficiency were normalized through treatment with vision therapy. These authors have produced a large volume⁶ of academic work in convergence and vision therapy.

Scheiman and others proved in the landmark series of Convergence Insufficiency Treatment Trials (CITT) that signs and symptoms of convergence insufficiency commonly can be permanently resolved in an individual.

Gallaway and Scheiman in research on the efficacy of vision therapy for convergence excess, which involved the treatment of esophoria, showed total elimination of symptoms in 80% of patients with convergence excess, and demonstrated that vision therapy alone is highly effective in eliminating abnormal vergence findings associated with esophoria at near ⁷.

The evidence is so strong now for the treatment of Convergence Insufficiency (CI) that follow on studies are beginning to look at the effects the CI directly has on issues which affect quality of life (QOL). In this vein, there is currently a very large program underway in the USA led by optometrist Professor Mitchell Scheiman to continue the work of the optometry and ophthalmology collaborative work of⁸ the Convergence Insufficiency Treatment Trial: Attention and Reading Trial (CITT-ART). This is a major randomized clinical trial evaluating the effect of vision therapy on reading and attention in school-age children with symptomatic CI, following on from the comprehensive CITT studies summarised by Scheiman et al in a Cochrane database publication⁹.



References

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- ¹ Convergence Insufficiency Treatment Trial Investigator Group. Randomized clinical trial of treatments for symptomatic convergence insufficiency in children. *Arch Ophthalmol* 2008;126:1336-1349.
 - ² Westmana M, Liinamaa MJ. Relief of asthenopic symptoms with orthoptic exercises in convergence insufficiency is achieved in both adults and children. *Journal of Optometry*. 2012 5, 62-67
 - ³ Serna A. et al. Treatment of symptomatic convergence insufficiency with a home-based computer orthoptic exercise program. *J AAPOS* 2011;15:140-143
 - ⁴ McGregor ML. Convergence insufficiency and vision therapy. *Pediatr Clin North Am*. 2014 Jun;61(3):621-30. doi: 10.1016/j.pcl.2014.03.010.
 - ⁵ Sreenivasan V, Bobier WR. Increased onset of vergence adaptation reduces excessive accommodation during the orthoptic treatment of convergence insufficiency. *Vision Res*. 2015 Jun;111(Pt A):105-13. doi: 10.1016/j.visres.2015.04.001. Epub 2015 Apr 16.
 - ⁶ Sreenivasan publications: https://www.researchgate.net/profile/Vidhyapriya_Sreenivasan/publications
Bobier publications: https://www.researchgate.net/profile/William_Bobier/publications
 - ⁷ Gallaway M, Scheiman M. The efficacy of vision therapy for convergence excess. *J Am Optom Assoc* 1997; 68:81-6.
 - ⁸ Scheiman M et al. Convergence Insufficiency Treatment Trial – Attention and Reading Trial (CITT-ART): Design and Methods. *Vis Dev Rehabil*. 2015 Oct; 1(3): 214–228.
 - ⁹ Scheiman M, Gwiazda J, Li T. Non-surgical interventions for convergence insufficiency. *Cochrane Database of Systematic Reviews*. 2011;(3):CD006768.