

ChromaGen Lenses for Use in Dyslexia

Interim Report on the use of ChromaGen contact lenses in patients with specific learning difficulties.

A comparative study with the Intuitive Colorimeter

ChromaGen contact lenses are a range of soft lenses with precision tinted pupils of varying hue and saturation which, when used in combination, have been shown to be of use to patients with defective colour vision (Figure 1). In a retrospective trial involving 275 patients, all of the subjects grading subjective improvements found at least a noticeable improvement in their colour vision, and 97.3% found a significant, or greater than significant improvement¹.



Figure 1

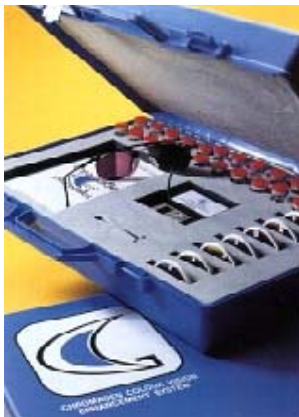


Figure 2

ChromaGen lenses are either worn in one or both eyes, depending on the results of tests on the patient. The practitioner carries out an assessment procedure using a fitting set containing 26 contact lenses and seven diagnostic spectacle lenses (Figure 2), usually in conjunction with a computerised test, although access to a computer is not obligatory. The Intuitive Colorimeter is an instrument that may be used to prescribe binocular precision tinted spectacle lenses to ease the symptoms associated with visual stress and Meares-Irlen syndrome^{2,3}. This instrument was developed by Arnold Wilkins of the Medical Research Council and has been used in clinical practice since 1993.

Anecdotal reports of increased ease of reading in colour deficient patients with specific learning difficulties, who had been fitted with ChromaGen lenses, reached the clinic. These patients had different types of colour vision deficiency, but found that print was clearer and easier to read when using their ChromaGen lenses. It was decided that a study should take place to explore any effect of the ChromaGen filters on the symptoms associated with reading difficulties in dyslexics. This interim report describes the results in an initial sample of nine patients.

Methods

Patients were selected from a local school specialising in students with reading difficulties and from a local university. All subjects had recognised specific learning difficulties, including dyslexia, and had statements of special educational needs. On arrival at the clinic, they had their colour vision tested with Ishihara (1994 edition) pseudo-isochromatic plates and were asked to read the list of words used in the Wilkins rate of reading test^{4,5}

Exclusion criteria included colour vision deficiency, identified with the Ishihara test, and the inability to read the basic list of words making up the rate of reading test. Before having the ChromaGen lenses fitted their eyes were also examined to rule out any contraindications to contact lens wear.

The patients were then randomly assigned to either the ChromaGen system or the Intuitive Colorimeter first, and the appropriate lenses dispensed before having their rate of reading measured on the Wilkins test. In the case of the Intuitive Colorimeter, the patient was required to hold uncut spectacle lenses in front of their eyes, sometimes in combination, in order to match the colours prescribed by the instrument. In an effort to minimise any placebo effect from the apparently 'finished' contact lenses provided by the ChromaGen system, the ChromaGen patients were given clear spectacle lenses to view the test, which they were told was an essential part of the system. Rate of reading tests were conducted twice with the prescribed lenses and twice with no intervention.

When the subject had completed the reading tests with the first set of lenses, they were given a short break before being assessed on the alternative system. The reading tests were then repeated using the lenses prescribed by that system.

Patients

Nine patients were recruited with an age range of 11-56 years - mean 25 years, S.D.=16. Eight patients were male and one was female

Results

By chance, the random distribution of subjects tested on the Colorimeter first were the older patients, and those with initially lower rates of reading. Age cannot be shown to have had a significant impact on the study, because there was no significant difference between individuals over 25 years and those under 25 years with regard to the practice effect ($p=0.7$).

As a group, these subjects demonstrated an overall increase in reading speed when using both contact lenses prescribed by the ChromaGen system and with spectacle lenses from the Intuitive Colorimeter. The overall increase in the rate of reading was greater with the ChromaGen lenses.

The size of any treatment effect can be defined according to Cohen's conventions⁶. In the case of ChromaGen lenses, the treatment effect was found to be 1.3 and the lenses prescribed by Colorimeter 0.9. Both of these are defined by Cohen as large significant treatment effects.

On this occasion, no baseline measurement of reading speed was considered necessary. However, analysis of the results show that ChromaGen lenses produced a statistically significant improvement over the non-treatment condition ($p=0.004$), while the lenses prescribed by Colorimeter, although producing a very marked improvement, did not achieve statistical significance ($p=0.06$).

Conclusion

Although this sample was small, analysis of the improvement in the rate of reading in these first nine patients suggests that ChromaGen lenses have a statistically significant effect on the reading ability of these dyslexics. Lenses prescribed by Colorimeter show a marked improvement, albeit not statistically significant, over and above any practice effects. Both systems demonstrate a significant treatment effect, according to the Cohen conventions, which has been investigated as part of a larger study. These preliminary results, in particular for the ChromaGen system, are promising. A larger study has been carried out in order to validate further these results in the population of dyslexics as a whole. Analysis of the data from this bear out the results found in this paper.

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References

1. Harris, D.A., "Colouring sight. A study of CL fittings with colour enhancing lenses". *Optician* 5604; 213: 38-41.
2. Wilkins, A.J., Evans, B.J.W., Brown, J. et al, "Double-masked placebo controlled trial of precision tinted spectral filters in children who used overlays'. *Ophthal. Physiol. Opt.* 14: @370.
3. Evans, B.J.W., Wilkins, A.J., Brown, J., Busby, A., Wingfield, A., Jeanes, R.J., Bald, J. (1996), "A preliminary investigation into the aetiology of the Meares-irlen syndrome'. *Ophthal. Physiol. Opt.* 16: 286-296.
4. Wilkins, A.J., Jeanes, R.J., Pumfrey, P.D., Laskier, M. (1996), 'Rate of reading test: its reliability and its validity in the assessment of the effects of coloured overlays'. *Ophthal. Physiol. Opt.* 16: 491-497.
5. Lightstone, A., 'Spectral filters on reading - the Wilkins rate of reading test. *Optician* 5620; 214: 20-21.
6. Cohen, J. (1 988), 'Statistical Power Analysis for the Behavioural Sciences' (2nd edition). New York Academic Press.