The Chromagen method for colour deficiency and specific learning difficulties

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Chromagen therapy was first devised by dispensing optician David Harris, who undertook his original R&D at the Corneal Laser Centre in Clatterbridge. Since then, the product was been bought and licensed by the Ultralase clinic in Chester. Recently Cantor & Nissel has become the new owner and sole distributor of Chromagen products. In the first instance Chromagen contact lenses were used to help patients with colour deficiency. Last year, David Harris published a report on his work using Chromagen contact lenses for patients with dyslexia. He has also suggested that Chromagen lenses could be helpful in reducing the frequency and severity of migraine.

Although the original sales push was to use the filters in contact lens form, it has now become the norm for Chromagen fitters to consider supplying the filters in spectacle form. In particular, filters supplied for Specific Learning Difficulties are more likely to be supplied in spectacles than in contact lenses, because the patients are often very young and the filters are only needed when the patient is reading and studying.

Chromagen filters come in nine colours and three intensities. The contact lenses are made from Benz 55 material, the usual parameter being 8.60 x14.50 with a 7mm tinted centre. Practitioners considering fitting these lenses need to attend a short training course to fully understand the techniques and subtleties needed. It is not easy to do and at least one hour is required to fit a patient satisfactorily. Colour vision therapy - All patients coming for colour vision therapy have to have two eyes because essentially we place a colour filter over the non-dominant eye while the patient observes a colour screen. The dominant eye sees the colours as always seen and the non-dominant has its colour perception changed dramatically. It does not matter if the eye is amblyopic or even divergent. The filters are coloured: violet, purple, orange, yellow, green, amber, magenta, light blue and dark blue. The best filter which most brings out the colours on the screen is found by trial and error.

There may be two or three colours that have the effect of enlarging the colour range and making certain colours fluoresce. Once the optimum filter is found, then an appropriate soft contact lens of the same colour is put in the eye. There are three intensities to choose from and the tint diameter can be varied too (5,6 or 7mm). (Naturally, no contact lens should be fitted without a full eye examination and contact lens work-up.) The patient is then sent off on a tolerance trial for several hours to see how the lens
helps the general colour perception and to see how the eye reacts to a contact lens. The patient usually returns extremely enthusiastic but some see little benefit. This ratio is about 3 to 1 in favour of the treatment at this stage. A final contact lens is then offered or the tint can be made up in spectacles. To hide the spectacle tint, the lenses are mirrored or semi-mirrored and look like fashionable sunglasses. Such spectacles are better for outdoor use, whereas the contact lens can be worn all the time. In most cases, a plano contact lens is used and the patient wears his regular spectacles over the top. All normal contact lens aftercare procedures follow, and the lens needs replacing on a six monthly basis. Some patients who are spectacle wearers may seize the opportunity to switch to contact lenses for both eyes. Often they have avoided them before, but the use of the Chromagen lens shows them how easy and comfortable contact lens wear can be.

How it works

There are no two colour defectives exactly the same. Everybody has a different perception of colour. However, broadly speaking, the majority of patients are red/green deficient or red deficient in a ratio of 3 to 1. There are some patients, who are almost totally monochromatic, who usually have a macula problem. Few women are colour defective (0.4%) though when they are, their defects are usually more intense and complicated than the men (8%). I explain to the patient as follows: "Everybody has three colour pigments in their retinas in an equal ratio of red, green and blue. Colour defective people have a deficiency in either red or green or perhaps both. Also, like dyslexia, there may be a chance of misinterpretation of the red versus green signals in the brain. So, what do we do with Chromagen therapy? We change the level of each colour going to the non-dominant eye. We might have 20% red, 30% green, 50% blue in the leading eye but 50% red, 40% green and only 10% blue in the non-dominant eye with the Chromagen filter over it. The brain is being sent two completely different sets of signals and the confusion caused allows the brain to differentiate between colours that had previously looked the same. The result is that the colour range perceived by the colour defective is increased two or three-fold. Before therapy the normal person might see 10,000 colours and the colour defective only 2000, but after therapy, the colour defective may have 6000 colours. The therapy does not give the colour defective perfect colour perception, but it does give them more colours, plus an ability to see colour differences that they could not see before and more accurate colour naming. They feel more normal and very excited by their new colour perception ability.

Key Points to colour vision therapy

- All treatment is carried out on a trial and error basis - no set rules.
- All patients must be given plenty of time to try tints out before any commitment.
- A walk around the local park or shopping centre is very helpful.
- Patients must have two eyes.
There is a significant drop in luminance and the VA in eye with tinted lens.

Chromagen tints come in three intensities. Often use the darkest tint to demonstrate test yet issue lightest tint for permanent use.

Size of pupil is important - usually tint is put at 5mm, 6mm, 7mm or 9mm diameters.

Usually use plano contact lens and spectacle top-ups. Spectacles may be made which incorporate tints but may need to be semi-silvered to hide tint difference.

Treatment is time consuming and expensive.

Chromagen should not be applied simply to pass an Ishihara test.

Usually only one lens is needed to get a good result.

Patients with specific learning difficulties or development dyslexia The use of filters, usually in the form of tinted spectacles or coloured overlays, to help people with reading difficulties is not new. Irlen, who coined the phrase "scotopic sensitivity syndrome", has raised the profile of the technique and carried out much of the early work. However, Meares first described the condition, which has now come to be known as Meares-Irlen syndrome in 1980, and this is characterised by symptoms, which include perceptual distortion to text, and benefit from the use of colour tints. One theory to explain the perceptual distortions found in dyslexics is that there is physiological impairment of neurones in the magnocellular system. It may be that Chromagen filters produce these perceived improvements by achieving a re-synchronisation of the magno and parvo-cellular systems. (See work by J. Stein et al.).

A good analogy is to imagine two fax machines communicating. On initial contact, they perform a hand-shaking process which synchronises them. If the handshake is not carried out correctly either the fax does not emerge or it is garbled. Spectral filters appear to synchronise the transmissions in the visual pathways so that the information which is distorted becomes clearer.

The haploscopic nature of Chromagen means that, by using a simple diagnostic procedure, a finely tuned result can be achieved. That is, they are prescribed independently so that different hues may be necessary for each. In trials, the Chromagen lens system has been shown to be of benefit to those dyslexics who suffer from the perceptual distortion of text that makes reading more difficult. These distortions include blurring (that cannot be corrected by refraction), movement of the letters or words, shimmering to the page, the words sinking into the white background of the page, pattern glare, and patterns formed by the spaces between words and lines which interfere with reading. Although Chromagen is a symptomatic treatment and the underlying neurological condition remains unchanged, in the majority of these patients the ease of reading is improved.
The assessment of the correct Chromagen filter for each patient is undertaken in a similar way to a Chromagen colour vision consultation, except the patient studies a page of black print on a white background. It is more likely that lenses for both eyes will be prescribed - often of the same colour. Patients who are colour deficient as well as dyslexic may be more difficult to determine the correct colour prescription. Experimentation has suggested that finding the Chromagen filter for their colour vision first and then the best filter for reading may give the best results. The Wilkins rate of reading test is used as an objective measure of the improvement in reading ability.

However, this test does not measure the reduction in distortion directly, but instead relies on the assumption that a decrease in distortion will lead to an immediate increase in reading speed. Although a significant increase in reading speed with Chromagen is good evidence that there is a genuine improvement in the ease of reading, it is quite possible that severe distortion could be eliminated entirely without an immediate increase in the reading speed. Some patients are quite overwhelmed with the increase in clarity of the text but have not achieved significant increases in reading speed. This may be due to the methods that they have been taught to read by, or just the fact that they need to relax into the new way of reading.

At follow-up consultations there is often a compound increase in the rate of reading with time so that a small improvement in the beginning translates into a much larger one several weeks, or months, later. This needs to be borne in mind when making the decision whether to prescribe or not. These follow-ups also demonstrate that the effect appears to be stable, so that no Chromagen filter change is necessary. Once a child starts using filters, they get a permanent improvement as long as they use the filter. They also seem to do better without the filter as their ability to read improves with education.

**Assessment**

1. Full optometric examination to exclude refraction or orthoptic aetiology of the difficulties. Often patients will already have a formal diagnosis - however, a Bangor dyslexia test is useful to get to know the patient and break the ice and to give us an idea of the problems encountered.

2. Carry out a baseline reading on the Wilkins rate of reading test.

3. Determine the non-dominant eye in the usual way.

4. Direct the patient's attention to the randomised text and use the trial filters, in front of the non-dominant eye to determine the correct filter for that eye. Ask: "Is the print clearer and easier to read (and are the distortions reduced, if applicable) with or without the lens?" Narrow the positive selections down to a single lens with forced choice, in the usual way.
5. With either the selected lens held in front of the non-dominant eye (either by hand or in a trial frame), or the contact lens inserted, repeat step 3 for the dominant eye. Contact lenses with the lightest saturation may give the best results. About 50 per cent of patients will select the same colour for the dominant as the non-dominant eye. Care must be taken that they do not make this selection purely on the basis that they feel more balanced with the same colour and their second choice. The difference can be dramatic. In any case, make a note of the second choice lens.

6. With the correct filter selected, the Wilkins rate of reading test should be carried out again.

7. Repeat the Wilkins test several times with and without the filters in place.

8. Carry out normal reading of text that the patient brings. As they read, pop the filters in and out. Listen for variations in their reading ability. This method is particularly useful to show change to anxious parents. In particular, the patient will exhibit far less hesitations and less stumbling on longer words and they sound more fluent and confident. A variation of this test is to conduct two readings: an extended baseline and a reading with the lenses in-situ.

If this procedure is adopted, the author recommends the following:

1. Before Chromagen assessment begins the patient first reads for two minutes, carrying on to the next paragraph if necessary. During this time the tester records 30-second markers on the scoring sheet. This will give four rate of reading results plus an average 60-second rate.

2. The procedure is repeated when the Chromagen lenses are worn.

This method gives the practitioner an indication of the change in rate of reading, both as a total and with time. (Some patients tire rapidly and using the test in this way highlights this very clearly. Interpretation The clearest indication of an improvement in the ease of reading is a significant increase in the rate of reading. Unfortunately, some patients will be excited by the reduction in distortion but fail to achieve a significant change in their rate of reading. In some adults and older children, the reason for this is that they have been taught methods of reading that force them to read at a measured speed. Thus they must learn to relax into wearing the lenses and to accept the improvement. If they repeat the test without consciously thinking about each word, the increase in reading speed can be marked.

Sometimes the only indication that there is a positive effect is from the patients themselves, who report a definite decrease in distortion. If this is the case, the practitioner (and parents, if applicable) must make a decision about the prescribing of lenses, usually in conjunction with the patient. It is sometimes helpful to give the patient some time on their own, with the lenses, to see the difference for themselves. (This equates to the walk that colour deficient patients take to assess the change with Chromagen for themselves).
Key points to dyslexia therapy

1. Many of these patients suffer from very low self-esteem. Although this is particularly noticeable in children, it often applies to adults as well, regardless of their achievements in life. Sometimes they need careful handling and they are often unhappy about reading in public. They may have been treated poorly at school and sometimes in their work. The counselling aspect is sometimes just as important as the optometric work.

3. Give the patients and/or their parent’s time to tell their story.

4. Listen for clues in their history for ways in which they can be helped now.

5. Don't prescribe spectacles unless you believe they will help and always do it on a money back if they don't help basis (it is only fair).

6. Carry out overlay assessment before using Chromagen filters. It may be that an overlay will help considerably. You might also like to carry out colorimetry on the Intuitive Colorimeter.

7. Keep techniques as scientific as possible. Do the Bangor test at the first visit and Wilkins rate of reading test at follow-ups.

8. Ask patients to bring reading material with them that they have difficulty with, and samples of their writing. Children's schoolbooks are often a revelation!

9. Keep an open mind as to what might help the patient best. These patients never cease to surprise and thrill the author. It is a continuous learning process for both practitioner and patient.

Testimonials

Three patients were asked to put into words what the use of coloured filters had achieved for them:

1. Overlays and spectacles for developmental dyslexia - This 14-year-old came to see me because I had helped his dyslexic brother with Chromagen contact lenses. I’m thick, he told me. That’s right, said his mother. He’s always been useless at school. He was severely disadvantaged by a lack of confidence with no encouragement from his family. As with so many dyslexics, he was not lacking in intelligence - only the ability to read.

He reported:

"Before using any reading aids I complained that words in books and on the blackboard appeared like bar codes making it difficult for me to work out print. After you gave me a pink filter to put over my work I found the letters appeared much clearer which meant that I could read quicker and more correctly. I soon found that I was able to read for much longer periods because my concentration had increased. "After using the overlay filter for around three months, I then chose a pair of reading glasses in the same pink tint. The reading glasses had the same advantages as the overlay filter but I found that print was even clearer! "The disadvantages of the glasses are that for a boy of my age in
secondary school, pink is a rather embarrassing colour and if I forgot my glasses for class I found it difficult to read. My reading level improved by three months in just one month and the school was amazed! Once again I would like to thank you for helping me and giving me the opportunity to improve on my learning.”

2. Chromagen contact lenses for specific learning difficulties - A drama student consulted me because her father in Australia had seen a programme on TV featuring the use of Chromagen contact lenses in helping people with reading difficulties. The Internet tracked me down. She was having severe difficulties reading and learning scripts plus she was unable to co-ordinate her actions on stage because of resulting stage fright. The use of deep blue Chromagen lenses in both eyes with the non-dominant eye’s lens being approximately 10% darker has increased her Wilkins rate of reading speed from 120 to 144 words per minute. Furthermore, her word retention (learning skill) has improved dramatically.

She reported:

➢ "I can concentrate well now.”
➢ "My focus is better both physically and mentally.”
➢ "I can follow lines well and I no longer jump words and lines.”
➢ "I no longer feel nervous when asked to read out loud.”
➢ "I no longer feel nervous and nauseous when reading out loud and I can do it confidently.”
➢ "Overall I am more confident and able to project myself with text reading.”

3. Chromagen contact lenses for extreme colour deficiency - This teenager has suffered from monochromatism all her life seeing very few colours at all. Her life has been blighted at school and she had been threatened with being placed in a class with the mentally retarded. Fortunately, her parents have fought hard for her but she has suffered from the stigma of being colour blind and therefore stupid. She wears soft lenses for hypermetropia; the left lens is tinted with a strong purple Chromagen tint.

She reported:

"It is difficult to put into words the transformation the lens has given me. Before I had the lens I experienced many problems!

Text books had to be photocopied. I could not read maps at all and was advised not to take geography GCSE. I did not notice things around me as much as I do now and things looked more plain and basic. Now I have the lens I can see and do so many more things. I still notice things I have never seen before. I can see colours where they never were before and I can complete more accurate shading etc. in art work. I can begin to read a map and see text books. I can now see clear rainbows and stained glass windows. I can see Christmas tree lights and the holly berries. I can tell if fruit is ripe and food looks
a lot more appealing. I can see the underground map more clearly. I can see advertising that is often in colours. I can see different butterflies in the summer and can tell the difference between more birds. I can see a robin’s red breast.

There have been a few problems: If I am doing a lot of work, my eyes get tired more quickly I cannot work too late in the evenings I cannot see through microscopes, as I need to see through both eyes for the colours to be effective. This also applies when taking photographs, which I needed to do for my textiles project.”