

Color Contact Lenses

for Cosmetic, Therapeutic and Special Effects

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Goal Statement: Color contact lens category, including cosmetic therapeutic or special effect contacts are discussed to help provide various options to your patients. Recent developments for low vision, sports application and misaligned eyes with new color soft lens technology are discussed.

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The color contact lens category that includes cosmetic, therapeutic and special-effect contact lenses generates an array of interesting options for your patients. It is estimated that the colored contact lens category is tracking for record-breaking sales over the next few years. Sales have thus far grown at a rapid annual rate, primarily because of baby boomlets, new disposable custom products and massive marketing campaigns. Here is a closer look at some of the many applications for color contact lenses that will help you provide more options to benefit your patients

Cosmetic Colored Lenses

Colored contact lenses for cosmetic use have increased in popularity among consumers: 25 million current vision-corrected patients and 13 million non-vision-corrected patients have thus far expressed interest in them. With 38 million consumers asking about colored contact lenses for cosmetic purposes, the average practitioner should be prop-

erly positioned to capitalize on this opportunity. According to major marketing studies, the main reason patients become interested in wearing colored lenses is that they want to feel good about themselves. Another reason is that applying differently colored contact lenses is an alternative to changing make-up and hair color to express oneself. The cosmetic lens category consists primarily of enhancer and opaque cosmetic soft lenses. We've seen little use for gas-permeable scleral and corneal applications in this category.

In the past, we've encountered issues relating this category that have caused concern for both eyecare practitioners and patients. For example, opaque color contact lenses, when they first became commercially available in the early 1980s, were unnatural-looking, uncomfortable and not disposable. Vision concerns revolved around smaller pupil openings in the lenses, which caused problems with night driving and dim illumination situations, as the pupil encroached the standard central

pupil opening. Patients were frustrated with the expense of replacing conventional colored contact lenses that were damaged from improper handling or ripping, especially in the plano category. Additionally, chair time and profitability were (and continue to be) major concerns to many eyecare practitioners.

Several leading manufacturers have made great strides to reposition this category so that it is more acceptable to patients and practitioners. Comfort issues of various designs, including Acuvue (Acuvue 2 Colours opaque and enhancers), Cooper-Vision (opaque Expressions, enhancer Accents), Ocular Sciences (opaque Biomedics Colors, opaque Cover Girl Colors) and CIBA Vision (Freshlook, Colorblends, Radiance, Dimensions, Enhancers and Focus Soft colors) have all been addressed. If disposable lenses are an available option, patients can now benefit from excellent color reproducibility and immediate delivery. Vistakon created a color lens design that includes a larger pupil opening, which maximizes vision without compromising the natural color of the lens. Other manufacturers, including CIBA Vision, Cooper Vision and Vistakon, have created "natural" iris patterns that more closely resemble real eye colors.

Other enhancer options for colored cosmetic lenses include Durasoft 2 Colors (CIBA Vision);

Optima 38, U4 and B3 Natural Tint (Bausch & Lomb), Classic Tint (Alden Optical Laboratories) and Vantage Accents (CooperVision). In addition to Classic and HP Tinted enhancer spheres, Alden also offers Alden Classic Torics, featuring various intensity and color options.

When striving for success in this area of contact lens sales, it is important to know all available color lens options, including specific designs and the benefits of individual mate-

yellow, violet and pink) are optional colors that can create significant cosmetic changes when used on light brown, hazel, dark green, gray and slate blue irises. Standard tints do not impair vision; optional clear centers are available from some of the custom tinting manufacturers.

You and your patients can obtain natural cosmetic and therapeutic benefits from contact lenses in this category. Enhancer lenses are designed to overlap the base iris color, typically providing lighter iris color and a very natural and subtle color effect. However, they can also create dramatic changes, even when applied to a light brown iris. Lighter eyes often benefit from blue, aqua and green enhancers for the most natural tones, but it is not unusual for practitioners to use brown, amber, yellow, violet and pink to change light brown, hazel, dark green and gray base iris coloring.

Be sure to fit enhancer tinted contact lenses slightly steeper than flat to maximize centration. The standard iris sizes will work on the majority of eyes, but some iris diameters greater than 12mm may need a custom design. Tell your patients that standard enhancer tints do not affect vision or color perception.

Enhancer cosmetic tinted lenses offer the advantages of looking natural and costing less than opaque or custom tinted lenses. They also promise fast delivery and good repro-

rials. Among the choices you need to consider are disposable, pad-printed, dot-matrix, hand-painted and hand-painted laminated lenses. In addition, you need to know when and how to employ cosmetic vs. therapeutic lenses, daily-wear vs. extended-wear lenses, disposable vs. extended-wear lenses and conventional vs. custom-designed lenses, to increase chances of patient success.

Enhancer Cosmetic Tints

Enhancer colors (brown, amber,

Market Overview

30 percent plano comprises cosmetic market

40 percent unplanned purchases of all color lenses

50 percent of all color wearers are first-time wearers

Color Mixing Guide

Base Color	Add Color	Resulting Color
Light brown (hazel)	Yellow	Golden brown
Light brown (hazel)	Orange	Bronze
Brown	Pink	Lavender
Hazel	Hazel	Gray
Green	Light brown	Deeper green

Reasons to Fit Prosthetic Lenses

Diplopia: Use as an occluder to eliminate double vision. This must be a dark black opaque tint that completely eliminates light.

Albinism: Lacking iris pigment causes extreme photophobia and macular complications from the intensity of light entering the eye. Darker brown or gray solid iris color is tinted with greater intensity to act like a sunglass and reduce photophobia. The iris coloring is recommended to be 2mm to 3mm larger than the pupil in dim illumination.

Amblyopia: Black occluded lenses are commonly used to totally eliminate light, color and form from a child's eye. Vision therapy often was challenged by the use of a black patch, which patients wore with reluctance because of comfort issues and psychological concerns of being ridiculed for looking "different."

Aniridia: An incomplete iris caused by either a congenital defect, trauma to the eye, or surgical complications. Iridectomy complications stemming from surgery can also result in this incomplete iris opening. Extreme photophobia is the diagnosis, and a prosthetic contact lens should be recommended. If a patient has insurance, it is not unusual to have the patient reimbursed for a therapeutic contact lens under a special procedure code (92499). The diagnosis: photophobia, with a diagnosis code of 378.54.

Figures 1 and 2 provide an example of aniridia secondary to a congenital defect causing an irregular iris, with a large opening. A custom hand-painted laminated soft contact lens provides not only exacting color and detail, but it also recreates a normal iris opening, reducing glare and providing normal light perception.

Fixed pupils: Enlarged, dilated pupils secondary to trauma or certain eye diseases can cause extreme glare. In the past, patients wore eye patches to eliminate this discomfort. We can now offer a prosthetic lens with a clear central pupil opening, with opaque coloring that mimics an iris. The lens must be central with minimal movement, and it's often best to request a black underbacking to eliminate glare—this is offered by some custom color manufacturers.

Heterochromia: Eye colors differ because of a congenital situation. The cosmesis can be improved by using one of many soft enhancer or opaque colors. It is very easy to offer two brown enhancer tints that overlap the existing eye color. If the patient desires lighter-colored eyes, an opaque lens color can also work successfully.

Disfigured or scarred corneas/leukocoria: Corneas disfigured from disease or trauma that result in scarred or leukocoric (all-white) opacities will benefit from prosthetic lenses, which conceal the defect and match the normal eye's color detail and design. Hand-painted opaque lens designs are commonly used to custom color the defective iris. Figures 3 and 4 show examples of a patient wearing a unique large, scleral, handpainted custom contact lens to realign a strabismic eye secondary to trauma or congenital complication.

Figures 5 and 6 demonstrate a leukocoric eye secondary to trauma. The eye became leukocoric over time, and the patient is totally blind and has no light sensitivity. A prosthetic lens was designed to match the iris color and pupil size in normal room illumination. You should recommend that prosthetic patients always wear eyeglasses, both as protection from possible injury to the only good eye and as a means to help camouflage the prosthetic lens.

Requirements for Fitting Prosthetic Lenses

- Measure pupil size in normal room illumination
- Obtain base curve and K readings (approximate using trial fitting lenses)
- Measure iris diameter (e.g., 11.5mm, etc.)
- Obtain a professional photo for color matching

ducibility. Disadvantages include minimal detail and less leeway to create many lighter eye-color options.

Custom Tinting

Many companies offer custom tinting, including Custom Color Contacts, Adventures in Color, Specialty Tints, Crystal Reflections, Marietta Contact Lens Service, Specialty Tint and Alden Optical. Custom tinting manufacturers can deliver unique colors of various intensities, diameters and pupil sizes. Depending on the choice of hydrogel contact lenses and water contact, some lenses are better for custom tinting than others.

Sports Applications

Color tints in contact lenses are also becoming more popular among athletes trying to gain an edge on the competition. Maximum contrast and reduction of glare are two benefits that sports-minded patients seek with tinted lenses. Lenses with various color intensities placed central to the pupil help create more definition and contrast for sports such as tennis, golf, baseball and skeet-shooting. For example, a green tint on a contact lens worn by a tennis player tends to maximize the wearer's image of the tennis ball. The ball appears darker and contrast is enhanced, so that the wearer can more easily discern an object, stimulating a reflexive response.

Other colors can help maximize depth perception: browns with red-orange tints, which absorb light in the ultraviolet region, and blue and violet from snow and sky. Certain



FIGURE 1. Example of aniridia secondary to a congenital defect, causing an irregular iris with a large opening.



FIGURE 2. A custom hand-painted laminated soft contact lens provides color and detail and recreates a normal iris opening.

colors help maximize the contrast between a golf ball and a blue sky or fairway background. A skeet-shooting patient's vision demands may benefit from tints that help increase background lighting and thus make the target appear closer, for sharper distance estimation. Sports soft lens tints also act like sunglass tints: yellow is best for cloudy days and green or brown for sunny days, for instance.

Low-Vision Aids

Color lenses are now available to help benefit low-vision patients who experience glare. These custom-colored lenses have a specific tint that is aligned in the central pupil area to remove glare and allow the wearer to perceive images more clearly. Glare is reduced more effectively this way than with sunglasses (where light can enter the iris from the side). Patients challenged with retinal problems, including diabetic retinopathy, retinitis pigmentosa, macular degeneration, optic atrophy, cataracts and albinism can also

benefit from wearing tinted contact lenses.

Contact lens tints for low-vision patients include red, bright yellow or green intensified colors. Although they are sometimes not cosmetically pleasing for the lightest irises, the visual benefits usually outweigh these concerns. The pupil size of the tint is important when fitting low-vision patients, because the coloring must be larger than the patient's actual pupil, and the lens must stabilize with minimal movement without compromising the cornea. You can achieve centration by using the tightest lens that will not cause edema or corneal complications.

Color Blindness

More than 20 million Americans experience some form of color blindness. The condition affects about 8 percent of men and about 0.5 percent of women. The majority inherit the deficiency, although several eye disorders may also cause color blindness. There is no known cure for color blindness, and those

who are affected should not be misled by claims of a cure. However, X-Chrom tints and ChromaGen have introduced tinted lenses that can help alleviate color blindness.

The X-Chrom red-tinted monocular lens has been on the market for years. X-Chrom contact lenses can enable those with color blindness to see some color, and they may even enable them to pass color vision tests.

The ChromaGen lens system recently received FDA clearance and is indicated for daily wear to enhance color discrimination in patients with protan or deutan (red-green) color vision deficiencies. The lens may be prescribed as a colored filter to aid individuals who experience reading discomfort unrelated to binocular vision problems or refractive error. ChromaGen colors include violet, pink, orange, yellow, green, aqua, magenta and blue. Because the tints are also available in varying densities, the lenses alter all three color characteristics of the light that enters the eye.



FIGURE 3: Patient with a strabismic eye secondary from trauma or congenital complication.



FIGURE 4: The same patient wearing a unique large scleral hand-painted custom contact lens.

Prescribing Prosthetic Lenses

Many cosmetic and therapeutic benefits result from fitting prosthetic contact lenses (see sidebar on P. 18). As an eyecare practitioner, you have the ability to improve your patient's quality of life. Perhaps no other service will be more gratifying to you than to help make a patient feel whole again. Being fitting with a prosthetic lens is often a very

emotional experience for a patient, and it is one that you will always remember as well.

I have been fitting prosthetics for many years and have encountered unusual cases. I have seen eyes disfigured by congenital defects, by knife wounds, by fish hooks, pencil points and gunshot injuries, for example. However, the one patient who stands out in my memory

came to my office with an unusual need for cosmetic colored lenses. The 23-year-old woman initially had been diagnosed as totally blind, with no light perception, secondary to a mismanaged glaucoma complication. She was left with perforated corneas and, eventually, leukocoric disfigured eyes (Figure 1).

Nearly every day, the woman and her mother (who had come to the office with her) fended off questions about what was wrong with this patient's eyes. Both she and her mother asked me to design a natural-looking lens that would conceal the disfigurement, quell the questions, and make her feel and look "normal." Ultimately, this patient was able to improve her quality of life by wearing the custom lenses. She felt normal and accepted again, knowing that her eyes were now natural-looking. Although she cannot see the lenses herself, she has asked why people no longer notice at first glance that she is blind. She goes nowhere without wearing the new lenses.

Colored Lens Use Cosmetic Applications:

- Natural changes for self-expression
- Prosthetic use for disfigured eyes

Therapeutic Applications:

- Prosthetic lenses for aniridia (opaque lens recreating an iris)
- Occluder black opaque for eliminating diplopia
- X-Chrom lenses for masking color deficiency
- ChromaGen lenses as a color aid for learning disorders (e.g., dyslexia)
- Custom tints for albinism (dark tints eliminate photophobia)
- Custom tints for low vision
- Custom tints for sports use (for maximum contrast and to eliminate glare)

Special Effects Applications:

- Novelty lenses for movies, television, video, Halloween, fun



FIGURE 5: Patient with a leukocoric eye secondary from trauma



FIGURE 6: A prosthetic lens was designed to match the iris color and pupil size (in normal room illumination).

CooperVision and CIBA provide disposable prosthetic lenses that are excellent choices for patients who desire inexpensive, reproducible lenses for prosthetic use. When seeking a close match of color to a non-affected eye, however, hand-painted custom designed lenses are probably the best choice. With these lenses, iris detail including flecks, coronas and coloring can be closely matched. Artists who hand-paint the lenses can be provided with digital photographs, which can be color-corrected when printed to provide exact coloring for matching. A translucent eye can change in different lighting, thus making custom designs for light-colored eyes more of a challenge. Pupil sizes also differ in lighting conditions, so it is not uncommon to have patients purchase more than one lens, if economically feasible, so that they can use different ones for differently lit environments.

Novelty and Special Effect Lenses

We have seen increasing interest

Actors using custom designed lenses for various roles

• Tom Cruise	<i>Days of Thunder</i>	Subconjunctival hemorrhage
• Tom Hanks	<i>Philadelphia</i>	Diseased eyes
• Jack Nicholson	<i>Wolf</i>	Wolf eyes
• Robert De Niro	<i>Frankenstein</i>	Horror eyes
• Alec Baldwin	<i>The Shadow</i>	Mirrored eyes
• Leonardo DiCaprio	<i>Basketball Diaries</i>	Dilated pupils

Current projects include:

• Catherine Zeta-Jones	<i>Oceans Twelve</i>	Natural laminated color change
• Liam Neesan	<i>Kinsey</i>	Aged eyes
• Laura Linney	<i>Kinsey</i>	Color change
• Ryan Gotling	<i>Stay</i>	Dead bloody eyes

in novelty lenses, especially for Halloween and other special events. Many new designs are offered from two manufacturers, CIBA with Wild Eyes and CooperVision with Crazy lenses.

Special eye effects are commonly found in movies, television and videos. These effects complement makeup and to help maximize an actor's role. Some special eye effects that are common to the movie industry include bloody, blind,

scarred, diseased, drug-glazed, dilated pupils, horror eyes, misdirected eyes, color changes and supernatural eye effects.



Dr. Cassel has a contact lens practice in New York City, where he provides special-effects custom contact lenses to the motion picture, TV and video industries. He owns an optical boutique in Rockefeller Center and is president of Custom Color Contacts.