

A Guide to Dispensing Contact Lenses

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Course Objectives:

Upon completion of the two hours home study course, the optician will:

1. Describe the history, general market, methods of production and practice trends in the contact lens industry.
2. List the anatomy and physiology of the eye and its relationship with the proper fitting and dispensing of contact lenses.
3. Identify the difference between an invalid contact lens prescription and one that meets the requirements of the Law.
4. List the differentiating lens types, lens materials and lens modalities both past and present usage in order to communicate effectively to patients.
5. Describe patient education regarding care and use of prepackaged soft contact lenses.
6. Identify circumstances that may require referral to a contact lens licensed optician or to a doctor.
7. List the various benefits for contact lens usage for consideration to first time contact lens wearers.

History of Contact Lenses



The evolution of contact lens can be traced all the way back in time to the 16th century when Leonardo da Vinci illustrated the concept of a lens placed on the eye itself. He designed a contact lens with a funnel on one side to pour water in it. Although this was impractical, it did spark others to develop similar technology. It was then in the 19th century British astronomer and physicist Sir John Herschel conceptualizes practical lens design. He was the first to suggest of an actual mold of the cornea could be taken. Even though his ideas in theory were sound, however, practical applications were too difficult to dismiss. One of the obstacles to overcome was to make a mold of the cornea, which contained thousands of nerves, making a very sensitive tissue to work with. In 1884, introduction of anesthesia made it possible for the contact lens technology to advance. Three years later, the first contact lens manufactured from glass, and fitted to cover the entire eye was made by F. A. Mueller who was a manufacturer of artificial eyes. The contact lens fitted the anterior of the eye naming it “scleral lenses.” Over a span of approximately sixty years, these lenses composed of glass were the major contact lenses used. As early as 1912, scleral glass lenses were produced primarily by Carl Zeiss Company in Jena, Germany.

The availability of plastics produced lenses were introduced in the 1930's that were lightweight and very clear. Due to their nature of stability, chemically consistent, unbreakable, scratch resistant and easier to produce made possible for change in the contact lens technology. In 1937, Theodore Obrig, developed manufacturing techniques for making plastic lenses and suggested the use of fluorescein dyes to study the form and structure of the lens fit against the patient's cornea. During the 1950's, PMMA (Polymethyl methacrylate) transparent thermoplastic material was utilized for the contact lens fitting. However, its inconsistency in the performance lens produced unpredictable results in both during and after wear.

Introduction of a new soft plastic polymer was developed that could be cut down or molded in variety of shapes. When this plastic was placed in water or an aqueous solution it would become soft, bendable and increased in diameter. The contact lens was pliable between finger and it would snap back to its original form. Unlike the first contact lenses that was rigid in nature and hydrophobic, the soft polymer contact lenses were soft and hydrophilic.

Materials Used To Make Contact Lenses

Used For Soft Contacts

Most soft lenses are made out of a material known as Hydrogel, a water absorbing polymer that uses the water content to transmit oxygen to the eye through the lens. This provides a more comfortable feel for the contact lens wearer. Hydrogel lenses are usually graded on how much water they hold, with some lenses holding as high as 70% water. While water does increase oxygen permeability, it also increases the size of the lens, which may in turn cause increased discomfort. Less water typically results in a thinner lens.

Silicone Hydrogel are an even newer type of lens material that has been developed for greater oxygen permeability while avoiding added bulk of larger lenses. Adding silicone to the hydrogel lens has shown to increase oxygen permeability by a significant amount, which many major lenses now make use of for added comfort. Doctors are preferring this contact lens material over others when fitting new contact lens wearers as well as an additional option for established contact lens patients.

Materials Used To Make Hard Contact Lenses

Hard contact lenses are manufactured with hard polymers (plastics) that are naturally porous enough to allow oxygen to reach the eye. The hard plastics give the lens wearer a higher level of optical clarity at the risk of initial discomfort while getting used to the lens. While soft contacts require water to transmit oxygen through the lens, hard lenses don't have this option, so they need to use materials that can naturally transmit oxygen from one side to the other in an incredibly efficient manner.

The first modern gas permeable lenses to gain wide acceptance were made of an oxygen permeable material called silicone acrylate (SA). These lenses were introduced in the late 1970s under the brand name Polycon. Originally, increased oxygen permeability was achieved by adding more silicone to the lens materials. However, this ultimately caused GP lenses to become more fragile and caused them to dry out and accumulate lens deposits more easily.

In order to achieve a high level of oxygen breathability, scientists had to add fluorine to the lens material to achieve the required oxygen permeability that would allow hard lenses to be worn on a long-term basis. Through adding fluorine, rigid lens materials develop microscopic holes and pores which allow oxygen to flow freely through the lens despite the fact that the lens is a solid material. Not only did it provide oxygen transmissibility, it also provided higher level of optical clarity.

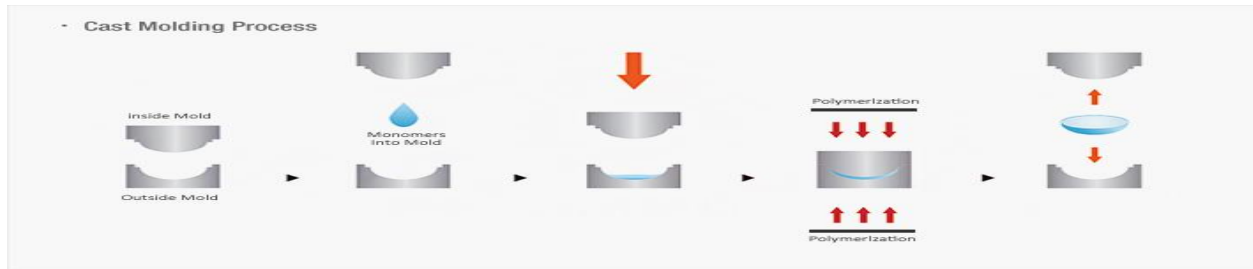
Materials Used to Make Hybrid Contact Lenses

Hybrid contacts are large diameter lenses that have a rigid gas permeable central zone, surrounded by a peripheral zone made of soft or [silicone hydrogel](#) material. The purpose of this design is to provide the visual clarity of GP lenses, in combination with wearing comfort that is comparable to soft lenses. Keratoconus, presbyopia, and high astigmatism patients are several eye conditions that would be suited to be fitted with this material.

Methods of Production for Contact Lenses

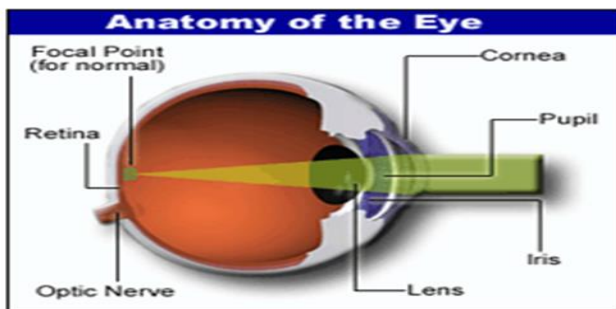
There are the three types of methods of production for the soft lenses. The first process which was produced by group of Czechoslovakian chemists under the leadership of Wichterle at the Institute for Macromolecular Chemistry of Prague was called spin- cast method. Two New York patent lawyers bought the rights and they licensed B & L to manufacture and market it globally. The polymerization was done in a spinning mold in which the optical power of these lenses was determined by the speed that the mold was spinning. The higher the speed, the greater were the centrifugal force and the displacement of the reaction mixture, and consequently the higher the minus power.

The second method of production is lathe-cut method. In this process, non –hydrated disks or “button” of soft contact lens material are cut from a long, slender, circular hard rod. These lens buttons are then lathed by a computer controlled precision cutting tools. Once the front and back surfaces are formed with the cutting tool, it is taken from the lathe to be hydrated to soften it. Afterwards, the finished lenses will undergo quality assurance testing. This form of production is for both rigid and soft contact lenses.



The third process is considered the most popular and most cost efficient method to manufacture soft contact lenses in mass quantities. It is accomplished by the use of injection molding. A very common and popular way to manufacture a wide variety of objects, and is used to create anything from action figures to medical devices such as contact lenses. The first step in the method is heating the lens material to the point of melting, then injecting the liquid lens material into a pre-cut mold. Once the lens material dries, it will solidify in the form of the mold, giving precise shape to the lens. After the lens is removed, extra material may be removed, and the lens will be polished prior to being inspected for quality. Injection molding is used only for soft contact lenses, as the process.

Before we venture in the types of contact lenses out in the market, a basic understanding of the anatomy and physiology of the eye will be reviewed. Several factors come in to consideration when determining the type of contact lenses for the patient for optimum vision and comfort.



Cornea

- It has nerve endings that are sensitive to touch, temperature and chemicals
- A touch of the cornea can cause an involuntary [reflex](#) for the eyelids to close
- Prime importance for the cornea to be transparent and it is why it does not have [blood vessels](#)
- It receives nutrients via [diffusion](#) from the tear fluid through the outside surface and the [aqueous humour](#) through the inside surface, and also from [neurotrophins](#) supplied by nerve fibers that stimulate it

- It has a diameter of about 11.5 mm and a thickness of 0.5–0.6 mm in the center and 0.6–0.8 mm at the periphery
- Cornea's refractive power is approximately 43 [diopters](#). Total combine with crystalline lens is approximately 60 diopters.

Iris & Pupil

- The pupil gets wider (dilate) in the dark but narrower (constrict) in light
- When narrow, the diameter is 2 to 4 millimeters
- In the dark it will be the same at first, but will dilate the maximum distance for a wide pupil 3 to 8 mm
- Iris is the colored part of the eye that regulates the amount of light that enters into the eye
- It is also the most visible part of the eye
- Light enters the eye through the pupil, and the iris regulates the amount of light by controlling the size of the pupil.
- The color of the iris is determined by a dark pigment called melanin
- The more melanin present, the darker the iris.

Retina

- One of the function is to receive images, which are composed of light rays, and send these signals to the brain so that you can see them!
- Two types of specialized cells in the retina called cone and rod photoreceptors, which play an integral role in the vision process
- The rod cells are responsible for processing black and white images (night vision especially). While cone cells process your color vision.
- Rod and cone photoreceptors actually change the incoming light rays to electrical signals which then travel via the [optic nerve](#) to your brain, where the images you view are processed.

Optic Nerves

- It is the nerve cable that connects the eye to the brain.
- Consist of one million nerve cells that transmit visual information via light rays by converting them into electrical impulses to the brain for interpretation
- Although the optic nerve is part of the eye, it is considered part of the central nervous system

Types of Contact Lenses

Over 24 million people in the United States now wear contact lenses. In certain instances, contact lenses may be considered medically necessary.

Many types of contact lenses are available. The type of contacts prescribed depends on the patient's particular situation. The ophthalmologist and/or optometrist will be able to help choose from the following types of lenses.

- **Soft contact lenses**
Most common type of contact lenses currently prescribed. These lenses are made with materials that integrate water, which makes them soft and flexible and more oxygen permeability to the cornea.
 - **Daily disposable lenses:** Although generally more expensive, they carry a lower infection risk
 - **Two week or monthly disposable lenses:** for daily wear
 - **Toric contact lenses:** Correct moderate astigmatism
 - **Bifocal contact lenses:** can be helpful for patients that need reading and distance correction but may not be right for everyone
- **Gas-permeable lenses**
These lenses are also known as "RGPs." They are rigid or "hard" lenses made of plastics combined with other materials—such as silicone and fluoropolymers—that allow oxygen in the air to pass directly through the lens. For this reason, they are called "gas permeable."
- **Hybrid lenses**

Very new to the market, it provides the visual clarity of the gas perm in the central vision and the comfort of the soft contact lens in the periphery. Higher success rate for fitting keratoconus, high prescriptions and multifocal contact lens wearers.

For the safety of your eyes, it is recommended that contacts should be removed at bedtime due to risk of infection and risk of contact lens intolerance.



Risk Factors

Daily wear should never be used as an extended wear schedule. A higher risk potential of eye infection occurs when used overnight. Most often poor cleaning and lens care can have temporary to potentially vision threatening to the cornea. Improper over wearing of contact lenses can result in intolerance, leading to the inability to wear contact lenses.

Gas perm lenses has the tendency to “pop out” of the eye due to the size and possible fit of the lenses. Ill fitted lenses and/or sleeping with them at night can potentially scratch the cornea. Newer lens design has taken this fact in account and improved it even during vigorous exercise.

Both gas perm and soft extended wear contact lenses are more prone to protein deposits build up and can lead to allergic reaction consequently. Discomfort, blurring, and intolerance to the lenses may occur if nightly disinfection is not done. A special cleaning solution may be needed to be able to dissolve the protein.

Who Should NOT Wear Contact Lenses

Most people who need vision correction can wear contact lenses. Among the conditions that might keep you from wearing contact lenses are:

- Frequent eye infections
- Severe allergies
- Dry eye (improper tear film)
- A work environment that is very dusty or dirty
- Inability to handle and care for the lenses properly
- Non-compliance to medical advice and instructions by doctor

Wear Your Lenses Properly

- Proper hand washing with soap prior to handling contact lenses or touching of the eye is a **MUST**
- Sharing of lenses with someone else is a **NO!**
- Plano color lenses, although for cosmetic use, are still required to be fitted by an ophthalmologist/ optometrist
- Do not purchase bootleg lenses
- Lens wear according to the schedule prescribed by ophthalmologist/ optometrist
- Disposal of lenses at the time frame prescribed by ophthalmologist/ optometrist

Proper Care for Contact Lenses

1. Contact lenses must be properly cleaned and disinfected when you remove them to kill germs and prevent infections
2. Daily cleaning of the contact lens case is a must. Replace every three months with a new case to prevent possible contamination.
3. Never reuse your contact lens solution or top off solution in your contact lens case
4. Dispose of contact lens solution in the lens case after each use and let the case air dry
5. Do not put your lens in your mouth and then in your eye
6. Never use homemade cleaning solutions as they have been linked to serious eye infections
7. Any eye drops, even nonprescription ones, can interact with all types of contact lenses. Use the prescribed brand of solution or check with your md/optometrist before changing brands

Removal of Contact Lenses and Doctor's Notification if these Symptoms are Present

- Your eye is painful
- You are very sensitive to light
- Your eye is red for more than two days
- You have discharge from your eye
- You have blurry, cloudy or foggy vision
- Your eye feels scratchy

Valid Written Prescription from Doctor

A contact lens is a medical device, and a poorly fitted lens — or one made from a material not well-suited to your eyes will lead to trouble. It can cause distorted vision, [discomfort](#), [infection](#), inflammation, swelling and abrasion. In rare cases, permanent [eye](#) tissue damage could result. Due to this, it is imperative to inform patient of the seriousness of having a valid prescription from doctor.

- By law, contact lens prescriptions are valid for a minimum of one year, or the minimum required by state law, whichever is greater
- Also by law, your [eye care practitioner](#) must give you a copy of your prescription at the conclusion of your [contact lens exam](#) and fitting — even if you don't ask for it.
- The length of time the prescription will be valid for is determined by the doctor- (consideration of overall eye health, possible vision change and lens tolerance)
- Eyeglass and contact lens prescription are not the same- look carefully to the rx
- The doctor will place the refractive power (+ / -), the base curve, cylinder and axis if astigmatism is corrective, and add power for presbyopic patients
- Base curve is prescribed to complement or match the curve of the cornea- the lower the number in millimeters the steeper the cornea
- Diameter of lens is given to determine where in the eye will the edges of the contact lens rest – incorrect diameter can result in irritation and abrasion
- If patient wants color contact lens – it will also indicate in the prescription the color selected which vary from manufacture and/or brand
- Brand of contact lens has to be present and cannot be substituted with anything else without doctor's approval and a new prescription written
- However, if private label contact lens are used by the eyecare professional, substitution of a national brand is permitted – (needs to be written by original doctor for the substitution)
- Name of the Doctor's office, patient's name, date of exam and signature of doctor needs to be present in order for it to be considered valid prescription
- If expiration date is not present, call for verification of doctor's expiration for documentation in records

1234 Street Rd.
Anywhere, USA
555-123-4567

Prescription

Name John Doe Date 1-23-2010

Address _____

	Spherical	Cylinder	Axis	Prism	Base
Distance {	<u>-2.25</u>	<u>-0.5</u>	<u>075</u>		
OS {	<u>-3.75</u>	<u>0.5</u>			
Reading Addition {					
OS {					

Multifocal Yes No
 PD _____
 Monocular PD (for PAL) OD _____ OS _____

	Base Curve	Sphere	Cylinder	Axis	Diameter
Contacts {	<u>8.4</u>	<u>-3.00</u>	<u>0.5</u>		<u>14.0</u>
OS {		<u>-3.75</u>			
Reading Addition {					
OS {					

Brand AVOASAP Refills 2 boxes
 Material _____ Wear Time 2 wks

Remarks: _____

Doctor Recommendation

<input checked="" type="checkbox"/> Single Vision	<input type="checkbox"/> CR-39	<input type="checkbox"/> No Glare Anti-Reflective
<input type="checkbox"/> No Line Progressive	<input checked="" type="checkbox"/> Fisher-Price? Polycarbonate <u>OV</u>	<input type="checkbox"/> Transitions? Photochromic
<input type="checkbox"/> Bifocal	<input type="checkbox"/> Slenderite	<input type="checkbox"/> Tint
<input type="checkbox"/> Trifocal	<input type="checkbox"/> Spherical Polycarbonate 1.5 mm	<input type="checkbox"/> UV
<input type="checkbox"/> Continuum™ (computer):	<input type="checkbox"/> Slenderite Ultra	<input type="checkbox"/> Sunglasses
<input type="checkbox"/> Slenderite Plus Spectralite	<input type="checkbox"/> Aspheric Polycarbonate 1.0 mm	<input type="checkbox"/> Safety
<input type="checkbox"/> Slenderite Polycarbonate	<input type="checkbox"/> Slenderite Plus	<input type="checkbox"/> Sports
<input type="checkbox"/> Contact lenses	<input type="checkbox"/> Spectralite	<input type="checkbox"/> Other _____
<input checked="" type="checkbox"/> Contact lenses & Eyeglasses	<input checked="" type="checkbox"/> Atonic 1.66 High Index (SV only)	
<input type="checkbox"/> Contact lenses & Plano Sunglasses		

Expires One Year From Date of Exam

Dr. Jane Doe O.D.

The Advantages and Disadvantages of Contact Lens

- ✓ Contacts conform to the curvature of your eye, providing a wider field of view and causing less vision distortions and obstructions than eyeglasses.
- ✓ Contact lenses don't get in the way when playing sports and exercising.
- ✓ Contact lenses won't clash with what you're wearing.
- ✓ Contacts typically aren't affected by weather conditions and won't fog up in cold weather like glasses.
- ✓ If you want to see how you would look with a different eye color, you can experiment with color contact lenses. You can even purchase special effect contact lenses to match your Halloween or fancy dress costume!
- ✓ Some contact lenses can reshape your cornea while you sleep. Overnight orthokeratology (Ortho-k) temporarily corrects myopia, so you can see clearly the next day without the need for glasses or contacts.
- ✗ Some people have trouble applying a contact lens to their eye (but proper technique and practice should rectify this in most cases).
- ✗ Contacts reduce the amount of oxygen reaching your eye and can cause or increase the severity of [dry](#) eye syndrome.
- ✗ If you work at a computer often, wearing contact lenses will likely contribute to symptoms of computer vision syndrome.
- ✗ Contacts require proper [lens](#) care and lens case cleaning each day, to avoid potentially serious eye infections. If you can't commit to the care and recommended replacement cycle of your contacts, consider [daily disposables](#).
- ✗ If you accidentally fall asleep while wearing daily wear contacts, your eyes typically will be dry, gritty, [red](#) and irritated when you wake. If you find yourself frequently falling asleep with your contacts in, consider extended wear — some extended wear contacts are approved for up to 30 days of continuous wear.

In Conclusion

Thanks to advances in contact lens technology, most people these days can wear contacts successfully, even if they prefer to wear glasses as their primary form of vision correction.

Whether it is for medical reasons or personal preference to wear contact lenses, the eyecare professional will be able to be familiar with the overview of contact lenses and recognize its effects on the eyes in order to provide the best possible care for each and every patient in contact with.

Test Questions for:

A Guide to Dispensing Contact Lens

- The first contact lens manufactured from glass and fitted to cover the entire eye was made by this person:

A. Carl Zeiss	C. Theodore Obrig
B. F. A. Mueller	D. Leonardo Da Vinci
- This naturally porous material provides higher level of optical clarity and efficiently transmit oxygen from one side to the other:

A. PMMA	C. Silicone Hydrogel
B. Glass	D. Hydrogel
- This method of contact lens production was produced by a centrifugal force which would determine the refractive power by the velocity it made:

A. Injection Molding	C. Scleral force
B. Lathe Cut	D. Spin cast
- The refractive power of the crystalline lens is approximately:

A. 22 diopters	C. 17 diopters
B. 43 diopters	D. 5 diopters
- The Cornea is absence of what element:

A. Blood Vessels	C. Tear Fluids
B. Nutrients	D. Nerve endings
- The color of the iris is determined by this pigmentation:

A. Mitosis	C. Melatonin
B. Myolin	D. Melanin
- This is the part of the eye that regulates the amount of light entering in the eye- making it dilate or constrict :

A. Crystalline Lens	C. Cornea
B. Iris	D. Pupil
- Although is in the anatomy of the eye, however, it is not considered part of it:

A. Aqueous Humor	C. Optic Nerve
B. Blood Vessels	D. Retina
- These specialized cells are responsible for night vision:

A. Neurotrophins	C. Cones cells
B. Optic charges	D. Rod cells
- If nightly disinfection is not done, the patient may experience what symptom/symptoms:

A. Discomfort	B. Blurring
C. Intolerance	D. All of the above

**Test Questions for:
A Guide to Dispensing Contact Lens**

11. These are all conditions that patient should not wear contacts lenses except:
- A. Severe allergies
 - B. Clean work environment
 - C. Dry eyes
 - D. Frequent eye infections
12. A contact lens examination is required by an eye doctor except for:
- A. Cosmetic use only
 - B. Weekend use only
 - C. Sport use only
 - D. None of the above
13. All types of contacts lenses can be interacted by:
- A. Prescribed eye drops
 - B. Over the counter eye drops
 - C. Both A & B
 - D. None of the above
14. A contact lens is considered to be:
- A. Accessory
 - B. Luxury item
 - C. Medical device
 - D. Commodity
15. Contact lens prescription is valid for:
- A. Always two years
 - B. Always one year
 - C. Time frame by doctor
 - D. Time frame by state law, if greater
16. Considerations of the length of time the contact lens prescription is valid by doctor are:
- A. Overall health of the eye
 - B. Lens tolerance
 - C. Vision change occurring
 - D. All of the above
17. Incorrect diameter can result with problems of the eye and these are:
- A. Irritation & abrasion
 - B. Seeing yellow lights & tearing
 - C. Both A & B
 - D. None of the above
18. A valid prescription will have written the refractive power needed and these items as well:
- A. Base curve & diameter
 - B. Brand of contact lens
 - C. Both A & B
 - D. Wearing time
19. To avoid potentially serious eye infections, it is recommended to:
- A. Proper lens care and lens cleaning
 - B. Replacement contact lens cycle
 - C. Use daily disposables
 - D. All of the above
20. Falling asleep with contact lenses not approved for continuous wear will result in:
- A. Dry & gritty eyes
 - B. Possible eye infection
 - C. Red & Irritated eyes
 - D. All of the above

Answer sheet for A Guide to Dispensing Contact Lens-2hr

Send this answer sheet only, do not enclose the entire printed material!

Also, do not take a picture of this page with your smart phone! Please scan to email or just mail it.

Email it: cedoinc@yahoo.com Or Postal Mail it: CEDO INC PO BOX 46486 TAMPA, FL 33646

Name _____ Opticians License # _____

Address _____ City _____ State _____

Zip _____ Cell Phone _____ Work Phone _____

Email: _____

Will be graded asap(usually 3-5 days) and uploaded to cebroker.

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