



National Academy of Opticianry

Continuing Education Course

Approved by the American Board of Opticianry and the National Contact Lens Examiners

Professional Liability for Opticians: A procedure to minimize the exposure to liability – Part I

National Academy of Opticianry
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National Academy of Opticianry

PREFACE:

This continuing education course was prepared under the auspices of the National Academy of Opticianry and is designed to be convenient, cost effective and practical for the Optician.

The skills and knowledge required to practice the profession of Opticianry will continue to change in the future as advances in technology are applied to the eye care specialty. Higher rates of obsolescence will result in an increased tempo of change as well as knowledge to meet these changes. The National Academy of Opticianry recognizes the need to provide a Continuing Education Program for all Opticians. This course has been developed as a part of the overall program to enable Opticians to develop and improve their technical knowledge and skills in their chosen profession.

The National Academy of Opticianry

INSTRUCTIONS:

Read and study the material. After you feel that you understand the material thoroughly take the test following the instructions given at the beginning of the test. Upon completion of the test, mail the answer sheet to the National Academy of Opticianry, 8401 Corporate Drive, Suite 605, Landover, Maryland 20785 or fax it to 301-577-3880. Be sure you complete the evaluation form on the answer sheet. Please allow two weeks for the grading and a reply.

CREDITS:

The American Board of Opticianry and the National Contact Lens Examiners have approved this course for one (1) Continuing Education Credit toward certification renewal. To earn this credit, you must achieve a grade of 80% or higher on the test. The Academy will notify all test takers of their score and mail the credit certificate to those who pass. You must mail the appropriate section of the credit certificate to the ABO and/or your state licensing board to renew your certification/licensure. One portion is to be retained for your records.

AUTHOR:

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COURSE LEVEL:

Intermediate

COURSE DESCRIPTION:

The professional liability of opticians and a procedure to minimize that risk is studied in this report. There is a review of the legal basis for lawsuits and a description of the liability laws and how they relate to the practice of opticianry. The course includes a discussion of the quantity of opticianry litigation in the courts today as well as areas of potential litigation. Finally, the author makes numerous recommendations to the practicing optician in order to reduce the litigation risk of day-to-day opticianry.

INSTRUCTIONAL OBJECTIVES

Upon completion of this course you should be able to:

- Understand the significance of the opticianry liability issue in today's marketplace
- Identify the most common areas of opticianry litigation.
- Describe the variables associated with and the degrees of impact resistance in common lens materials.
- Explain the legal basis for opticianry litigation.
- State the necessity of obtaining and scrupulously following industry standards in everyday opticianry practice.
- Outline the steps that need to be taken in everyday opticianry practice to minimize your exposure to liability.

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**PROFESSIONAL LIABILITY FOR OPTICIANS:
A Procedure to Minimize the Exposure to Liability
PART I**

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Introduction

There appears to be much speculation and yet, frequent misconceptions regarding professional liability for opticians. Most practitioners that are asked are under the impression that there is little to no liability concern for the average optician. What is your opinion? Is this a major concern? Or perhaps a minor concern? Perhaps we can flesh out your opinion with a simple quiz. As you read the following comments make a mental note of whether you think the statements are true or false.

1. Lenses made of ophthalmic plastic consistently outperform either heat tempered or chemically tempered glass lenses during impact resistance testing.
2. All ocular injuries are preventable.
3. If a patient withholds an intended activity from the optician, the optician would be relieved of liability if the eyewear should fail during that activity.
4. Specific national standards for the fabrication of sports related eyewear do not currently exist.
5. Utilizing full ANSI standards in the fabrication of industrial eyewear would result in little or no liability for the optician.
6. It may be unusual, but there is nothing legally preventing an optician from dispensing an industrial safety lens/frame in a dress lens/frame.
7. Testing, via the drop-ball method, is never required of the dispensing optician.
8. Significant ocular damage can be prevented by simply wearing eyeglasses of any type.

Believe it or not, these statements are all false! There is no truth in any of them whatsoever. For number one, it all depends on the object size and speed as to which material would be better suited for impact protection. According to Prevent Blindness, only 90% of ocular injuries are preventable. The courts have held consistently that opticians have a *fiduciary responsibility* to find out how the eyewear is intended to be used and to make the appropriate recommendations for that usage. As for number four, The American Society for Testing Materials (ASTM) does exist, does test eyewear for sport fitness and resides in Philadelphia, Pennsylvania.

Statement number five may be a puzzler, but what if the optician recommended full ANSI standards for plastic lenses and never mentioned polycarbonate to the patient when that is the safest lens material in existence? Imagine you were involved in number six. How would you explain to a lawyer that you knew the patient needed protection with say, 3mm CR-39 lenses but you put them into a dress frame? Explaining that your patient needs extra lens protection but not frame protection would be awkward at best.

The 1972 FDA mandated impact resistance test (21CFR801.410) is an area of great misunderstanding. Any optician that is in the habit of taking two uncut lenses and putting them into ophthalmic frames is classified as the manufacturer. This means that the optician is legally responsible for the eyewear. If the optician makes glass lenses, then each and every lens has to be either chemically or heat tempered and drop-ball tested with a ledger kept with the results. Plastic lenses are *usually* covered by statistical testing for impact resistance performed by the lens manufacturer. If the optician makes plastic lenses and does anything besides edge, perhaps tint, and insert the lenses they **MUST** be drop-ball tested. This means hand-stone edging, coatings, drilling, notching, grooving, etc removes the blanket immunity from the optician and places 100% of the liability on the manufacturing optician's shoulders. (www.accessdata.fda.gov/scripts).

Finally, Erie (1991) found in a study that the vast majority of eyewear injuries occurred from broken pieces of lens or frames being driven into the eye or its surrounding tissues. For most of these people, there would be no ocular damage if they were not wearing eyewear or perhaps were wearing more appropriate eyewear.

As you can see, there are many misconceptions regarding liability and the optician. It is these very misconceptions and sometimes outright myths that led to this study in the first place. Opticians need to be made aware of where they stand in the legal world. Most opticians have probably already read one or two items that they are guilty of performing or not knowing – some on a daily basis. For unknown reasons, how we need to protect ourselves and the patient in the optical world is so often overlooked. This study hopes to contribute to changing that status.

Abstract

The professional liability of opticians and a procedure to minimize that risk was studied in this report. The researcher gathered historical and descriptive data and developed a resource letter which was mailed to industry experts in order to gather pertinent data on ocular injuries and opticianry litigation.

The findings reveal that there is a strong perception of increased opticianry litigation. However, the findings also reveal that there is not now, nor is there likely to be, a statistical foundation for this perception. The findings did reveal, however, that there is a sound legal basis for exposure to potential liability by opticians who fail to recommend and document the usage of polycarbonate lenses in specific circumstances.

Recommendations were made based upon the findings and the need for additional research acknowledged.

I. Problem Statement

In recent years, professional journals and seminars have been replete with dire warnings about the rise in lawsuits against opticians but have lacked proper documentation for these claims (Woods, 1992; Vinger, 2011). Therefore, the researcher intends to pursue this topic to determine if, in fact, there has been an increase in opticianry litigation in the United States.

Specifically, the researcher will investigate whether or not the failure of Opticians to recommend polycarbonate was a factor in the lawsuit and if its usage would have mitigated the circumstances. An attempt will also be made to formulate an approach or system which would reduce the degree of liability for dispensing opticians and perhaps the number of lawsuits.

The hypothesis of this study will be that an investigation of the professional liability of opticians will reveal that there has been an alarming increase in opticianry litigation due to the lack of usage of polycarbonate lenses and, as a result, a recommendation is needed to minimize the degree and frequency of these lawsuits.

The major questions to be addressed in this paper are: Will an investigation into professional liability of opticians reveal an increase in opticianry litigation due to the lack of usage of polycarbonate lenses; and, Is there an appropriate recommendation to minimize the degree and frequency of these lawsuits?

The findings of this research report were limited in scope, time, materials, subjects, and statistical procedures used by the researcher.

DEFINITION OF TERMS

A.N.S.I.

American National Standards Institute --A private corporation which develops and publishes standards and guidelines for many industries, including eyecare.

A.S.T.M.

American Society for Testing Materials -- A private corporation which tests the safety of eyewear and certifies it acceptable for specific sports. Their evaluation simulates the impact that one would receive if participating in a particular sport. The testing is done on an entirely voluntary basis.

Express Warranty

A statement of fact from the seller concerning the sale of goods (*Starsky, 1990*).

Fiduciary

In general, a person is a fiduciary when he/she occupies a position of trust or confidence in relation to another person or his/her property (*Corley, 1979*). Here it is used to describe the relationship between an optician and their patient.

Implied Warranty of Fitness

The consumer is entitled to believe that the goods are fit for a particular purpose, as distinguished from ordinary use. The buyer is relying on the seller's (optician's) expertise (*Starsky, 1990*).

Implied Warranty of Merchantability

The consumer is entitled to believe that the goods purchased are fit for the ordinary purposes for which the goods are intended and used (*Starsky, 1990*).

Liability

In its broadest legal sense, the word means any obligation one may be under by reason of some rule of law (*Corley, 1979*). Here it is applied to both professional and product liability.

Negligence

The failure to do that which an ordinary, reasonable, prudent person would do, or the doing of some act that an ordinary, prudent man would not do. Reference must always be made to the situation, the circumstances, and the knowledge of the parties (*Corley, 1979*). Here it means that the courts will decide if the optician behaved in a manner consistent with other, reasonable opticians.

Optician

One who is extensively trained in the interpreting of ophthalmic prescriptions and applies that knowledge to obtain the optimum visual and safety performance for the patient in a pair of spectacles or contact lenses (*Ophthalmic Dispenser*) (*Thomas, 2004*).

Polycarbonate

A thermo set plastic ophthalmic lens which is one of the lightest and is the most impact resistant lens material available. It also boasts of 99% ultra-violet radiation absorption and a scratch resistant coating as standard (*Drew, 1990; Karp, 2004*).

Product liability

An area of liability caused by products that have been placed on the market and prove defective in some manner. The causes of lawsuits are: negligence, breach of express warranty, common law deceit, breach of implied warranty of fitness for a particular purpose, breach of implied warranty of merchantability, and strict liability. The areas of defect are:

- **Manufacturing defect:** The product does not conform to its design.
- **Design defect:** The product does conform to its design, but the design is defective in some manner.
- **Defective warning:** There are no effective instructions or warnings to go with the product. The consumer should have been told what the product can and cannot do (*Starsky, 1990*).

Strict liability

The general meaning is liability without fault. If you engage in a certain kind of conduct that causes harm, liability will result irrespective of intent, negligence or innocence (*Starsky, 1990*).

II. Review of the Literature

Bruneni, J. "Duty to warn... What ignoring it can cost you." *Eyecare Business*, June 1997: 42 – 46. The author analyzes five optical lawsuits and discusses how to reduce your risk for lawsuits by following duty to warn guidelines.

Bruneni, J. "Protecting kids (and others) through 'Duty to Warn'," *Eyecare Business*, November 2000. The author discusses your professional duty to establish a program to inform patients about the impact resistance of lenses.

"Duty to warn." The Optical Laboratories Association 1994. An in-depth explanation of the legal obligations of this issue for all ophthalmic professionals.

"A guide to practice growth in the 90's." Gentex Optics 1990 (*20/20 supplement*). Physician and Sports Medicine, November 1991: 108122. A detailed article which delineates the causes and treatments of ocular injuries. A special emphasis is placed upon prevention through protective eyewear.

Grootegeod, J. "What's the difference between sports and safety glasses." The Dispensing Optician, March 1987:8-11. A four-page article addressing the differences between dress eyewear and industrial safety and sports eyewear. The author makes recommendations on ways opticians can limit their liability.

Heiting, G. "Preventing Eye injuries." Retrieved from allaboutvision.com on July 29, 2017. Discusses several areas of unusual eye injury including Laser pointers, fireworks, paintball and ways to prevent injury from same.

Karp, A. "Eyeopener," 20/20 Magazine, November 2003. An interview with Pamela Miller, a respected authority on Duty to Warn and its implications for the dispenser.

Pagan-Duran, B. "Preventing Eye Injuries." Retrieved from AAO.org on August 9, 2017. Reviews facts versus myths related to eye injuries.

Stock, J.G. & Cornell, M.F. "Prevention of sports related eye injury." American Family Physician, August 1991: 515-521. An account of the etiology of ocular injuries and the prevention procedures available for specific sports.

Vinger, P. et al. "Shatter resistance of spectacle lenses," JAMA, January 1997: 142- 144. The authors analyze the impact required to break common ophthalmic lenses and discover that they cannot break 3.0 mm polycarbonate even with their equipment at maximum power.

Vinger, P. "The Mechanism and Prevention of Sports Eye Injuries." Retrieved from astm.org on August 12, 2017. Dr. Vinger discusses the medical impact of injury, injury prevention and legal ramifications for the professional.

Woods, T. "The role of opticianry in preventing ocular injuries." International Ophthalmology Clinics, 1988:251-254. The author spends four pages detailing the steps that an optician should take to identify areas of their patients' lives which expose them to potential inordinate ocular hazards and the subsequent liability.

Yoho, A. "Your duty to warn and inform," Eyecare Business, June 2003. A discussion of the need and procedure for conducting proper duty to warn through a question and answer format with industry experts.

III. The Subjects, Materials, and Procedures

This investigation concerned the professional liability for opticians not recommending polycarbonate lenses in the United States. In addition, the investigation also concerned the development of a technique to minimize the severity and frequency of these lawsuits. The subjects, materials, and procedures are described in this section.

SUBJECTS

The population for this study was constructed of all of the opticians in the United States. More specifically, all of the opticians in the United States who have been sued as a result of traumatic ocular damage.

MATERIALS

A review of the literature provided the data for substantiation and significance of the problem. The researcher used the library and the computer sources and services in Seton Hall University in South Orange, New Jersey, as well as the Somerset County Library in Bridgewater, New Jersey, and the Raritan Valley Community College library in North Branch, New Jersey. The researcher also utilized the ERIC, DIALOG, and CINAHL-CD ROM search techniques.

The principal material used in this study was a letter addressed to fourteen optical industry experts requesting statistical data related to this problem (*Appendix A*). The letters were used as a tool to gather statistical data on the number of opticianry lawsuits related to either professional or product liability; the number of documented ocular injuries; and a request for additional sources.

PROCEDURES

The researcher gathered the statistical data received from the respondents (*Appendix A*) and performed a detailed analysis of their findings. This, coupled with the literature review, provided substantiation for the hypothesis of this study. Based upon these findings and further literature review, the researcher devised a procedure for minimizing the severity and frequency of these lawsuits that is not only practical but also effective. In 2004 and again in 2017, the researcher reviewed this topic extensively. Another review of the literature was conducted and further statistical analysis was conducted. The hypothesis was fully substantiated yet again.

The data was subjected to analysis using appropriate statistical techniques of percentages, means, and standard deviation.

IV. The Results of the Study

The findings of this investigation were concerned with historical and descriptive data pertaining to the incidence of lawsuits against opticians related to ocular injuries in the United States. In addition, industry experts were consulted for additional data concerning both opticianry lawsuits and ocular injuries. An attempt was also made to provide recommendations for minimizing opticianry liability risk.

The major findings of this study were reported in two sections: (1) historical and descriptive data; and (2) statistical data on ocular injuries.

HISTORICAL AND DESCRIPTIVE DATA

A review of the literature revealed a magnitude of expressed concern relating to the problem of opticianry litigation (*Bruneni*, 1997; *Chase*, 1988; *Erie*, 1991; *GIII*, 1985; *Grootegoed*, 1987; *Laluzerne*, 1988; *Stock*, 1991; *Vinger*; 2011). In fact, the original FDA impact resistance standard had its genesis from consumer complaints of eyewear breakage and injury (www.accessdata.fda.gov/scripts/)! Since the advent of the polycarbonate lens in 1979, liability has become an increasingly important consideration for the ophthalmic community (*Chase*, 1988). In addition, recent years have produced an additional concern for liability. With the nationwide interest in recreational pursuits has come the increase in sports-related ocular injuries (*Grootegoed*, 1987, p. 8).

Furthermore, recent court cases have set the precedent that the ophthalmic community has a legal responsibility to inform their patients about the proper usage and safety issues concerning the products they recommend and dispense (*Laluzerne*, 1988, p. 3; *Vinger*, 2011).

The literature review identified that opticians are sued in three major areas:

- 1) professional negligence
- 2) strict liability
- 3) product liability
 - a. manufacturing defects
 - b. design defects
 - c. defective warnings

Professional negligence centers around the fiduciary responsibility of an optician. In simple terms, an optician is not held to the same standards as an ordinary citizen. The fiduciary responsibility of the optician is to ensure the visual and safety requirements of the patient. This includes the responsibility of determining how and when the spectacles are to be utilized. The simple fact that the patient did not mention pertinent facts may be no defense. In its simplest terms, the fiduciary responsibility is as if the optician is the parent and the consumer is the child. The parent must protect the child at all times and under all circumstances. The optician has the responsibility to uncover all of those pertinent facts (*Starsky*, 1990, p. 7; *Woods*, 1992).

In cases of negligence, the courts used the standard; did you behave in a manner consistent with what an ordinary, reasonable, prudent optician would have done under the same or similar circumstances (*Bruneni*, 1997; *Woods*, 1992)? Determining the answer to this question can be an arduous task. However, there are areas that are surprisingly simple and liability prone.

Is it unreasonable to believe that a normal, healthy child would be engaged in ball or contact sports? Is it unreasonable to believe that an adult might mow their lawn or use some other garden tools? Is it unreasonable to suspect that an adult utilizes power tools? Is it conceivable that the elderly may be unstable on their feet? Should we protect the monocular patient to the maximum of our abilities? Should we find out that our patient is a paintball enthusiast (a hobby that has

seen ocular injuries triple in recent years)? Is it unreasonable to assume that an adult engages in recreational sports or hobbies (*Woods, 1988, p. 252; Karp, 2004*)?

The answer to all of these hypothetical questions is an unequivocal NO! Yet, how often does the average dispenser take these questions into account when designing a pair of spectacles? Any optician dispensing eyewear that is not fit for these or other specific, foreseeable circumstances is prone to a liability action in the event of physical harm (*Gill, 1985*). Furthermore, the answer is not as simple as adhering to the current ANSI standards either.

With the advent of the polycarbonate lens, there is a new wrinkle in negligence proceedings. Since the preponderance of evidence clearly shows the superiority of polycarbonate for impact resistance, it is difficult to make a defense for *any* other lens material utilized in foreseeable, risky circumstances (*Bruneni, 1997; Woods, 1988, p. 252; Chase, 1988*). In the past, adherence to ANSI standards was generally accepted as prudent behavior for an optician.

Now, however, since it is reasonable to assume that every optician knows or should know about polycarbonate, there is a different test. Would polycarbonate lenses have prevented or at least minimized the injury? If the answer is yes, winning the litigation may be next to impossible.

Simply utilizing polycarbonate lenses is not always sufficient either. The frame selection must be taken into account as well. Utilizing a mixture of dress lenses/frames with industrial safety or sport designed lenses/frames is foolhardy. Today's optician is also held accountable for knowing and using specialized frame selections. These include frames conforming to ANSI occupational safety standards and ASTM sport standards. If you realize that someone needs additional safety with a frame from one of these categories, how could you defend using anything different than polycarbonate lenses (*Chase, 1988*)?

Strict liability is an issue that falls into a rather grey area. Consumers have the right to be protected from unreasonably dangerous circumstances. If an optician sells an item that causes harm, he/she can be liable regardless of intent or negligence (*Starsky, 1990, p. 7*). This area includes the consumer's right to be informed of any product limitations, usage, care and maintenance (*Laluzerne, 1988*).

However, it is not deemed sufficient for the optician to simply warn a patient of these conditions. Again, the optician has the fiduciary responsibility to take steps to lessen the dangers. Documentation by the optician in these matters is critical. Consistency in record keeping may be the optician's best defense for suits brought under this tactic (*Chase, 1988; Gill, 1985; Woods, 1988, p. 251*).

Product liability is the last major area of opticianry litigation. It involves legal action that can and cannot be defended or foreseen. In general, product liability is encountered when any product dispensed proves defective in some manner and causes harm. The defects could be in manufacturing, design or warning. The suits are brought under express warranty, implied warranty of fitness and implied warranty of merchantability (*Starsky, 1990, p. 436*).

Express warranty involves statements made by the optician during the sale of the spectacles. At times it is considered misrepresentation. An example might be a statement that the lenses are shatterproof as opposed to impact resistant. The consumer has the right to rely on this information and act accordingly. If the statement does not hold true, a liability action could ensue (*Chase*, 1988). Therefore, any erroneous statements should be immediately corrected.

Implied warranty of fitness entails the consumer's reliance upon the optician's advice and counsel during the transaction. This involves the patient trusting the optician's expertise to recommend a product that will perform a specific function or an intended specific purpose. An example might be that the patient requires a pair of occupational safety glasses for the occupation of metal grinder. The patient is relying on the optician's expertise to recommend a specific product for that use. If the recommended product should fail, liability could follow. Here again, the optician cannot rely solely on ANSI standards. Any recommendation made that does not include polycarbonate, and perhaps an additional polycarbonate face shield would probably be difficult to defend. In this particular occupation, there is the obvious risk of high-speed flying debris.

Any recommendation short of the ultimate impact resistance could be construed as a breach of implied warranty (*Chase*, 1988; *Starsky*, 1990, p. 450).

Implied warranty of merchantability is similar to implied warranty of fitness. They differ in that merchantability relates to ordinary use. The consumer has the right to believe the product is fit for the ordinary purpose of its intended use. This concept entails the spectacles failing under ordinary circumstances, but it can be tied to the optician's failing to foresee predictable usage for the spectacles. The simple act of a child falling off a bicycle and being harmed by the spectacles could be (and has been) an example of this type of litigation. Currently, there is evidence that a particular frame material fails under extreme cold conditions. In certain climates, this alone could result in litigation (*Starsky*, 1990, p. 449).

The literature review also uncovered an ancillary area of opticianry litigation -- sports injuries. While the nature of the liability remains the same as already discussed, this area has peculiarities that need to be addressed.

In 1983, the American Society for Testing Materials (ASTM), established a standard for eye protection in racquet sports. This action was deemed necessary since the impact levels in sports are often higher than in dress or occupational situations (*Woods*, 1988, p. 251).

The ASTM performs rigorous and extensive testing for eye protection on an individual sport basis. Each frame is tested and certified specifically for a given sport. What this means is that a frame certified for racquetball cannot be assumed to be advisable and safe for tennis. Unfortunately, however, the testing is done on a purely voluntary basis. With the increase in recreational sport activity today, it is imperative that every optician gets a copy of these standards and utilize their recommendations fully. It is vital that the optician only recommend frames that are ASTM certified for the sport the patient is playing. The manufacturer's literature should list the sport specifically and bear the certification from ASTM of F803.88a. It is also important that the optician realize that not all sports have approved eyewear. For example, it is unlikely that we will ever have protective eyewear for a sport like batting in baseball (although

there is protection for fielding in certain age groups). The ball is simply too heavy and travels at too great a speed for a frame to likely absorb that impact. It is also imperative that today's optician anticipate every patient's involvement in sports and make the appropriate recommendations (*Woods, 1992*).

POLYCARBONATE LENSES

One item which became abundantly clear during the literature review was that polycarbonate lenses are simply unmatched in impact resistance (*Pizzarello, 1987, p. 12; Gill, 1985; Davis, 1988, p. 218; Karp, 2004*). *Vinger (1997)* reported that only 3.0 mm polycarbonate did not break under extreme testing conditions. In addition, there are some gargantuan surprises in the impact resistance of plastic lenses and both heat and chemically tempered glass lenses.

Since the FDA ruling in 1972, all glass lenses must be made impact resistant. This can be accomplished by either heat or chemical tempering. In addition, the ANSI standards recommend that glass dress wear be a minimum of 2.0mm thick and that occupational safety lenses be 3.0mm thick at their thinnest points. In August of 2003 and subsequently, ANSI upgraded these standards to Z87.1. Polycarbonate now qualifies for a minimum 2.0 mm thickness high impact designation. This means that polycarbonate has their highest rating for impact resistance while having its minimum thickness reduced to 2.0 mm. Since the original issuance of the 1972 ruling, it has become popular to believe that chemical tempering was far superior to heat tempering and that plastic lenses were far superior to either. The literature does not support these beliefs. ANSI no longer supports these beliefs either because neither glass nor CR-39 is rated for high impact resistance regardless of the lens thickness (*Karp, 2004*).

What the literature does show is that any of these alternatives can be superior, given specific circumstances. For example, untreated glass has been shown to be more resistant to either treated glass when impacted with small steel balls. Plastic is far superior in these cases, but it is less resistant to slower, heavier blows (*Davis, 1988, p. 215; Vinger, 1997*). On the other hand, polycarbonate is the only lens material that withstands both types of impact consistently (*Vinger, 1997 & 2011*).

In addition, polycarbonate is the only material that has never failed in ASTM testing. Furthermore, polycarbonate has been shown to withstand the impact of a 22-caliber long rifle bullet (*Pizzarello, 1987, p. 13*)! In fact, polycarbonate has been shown to be 100 times more impact-resistant than plastic for small missiles (*Davis, 1988, p. 218*).

Polycarbonate also has additional benefits. It is among the lightest lens materials, with only two lenses marginally lighter in weight which may *not* be maintained when matched RX to RX due to their index of refraction being substantially lower than that of polycarbonate. It can be tinted to any shade. It naturally provides ultra-violet radiation protection, which might be a source of future liability, and it comes with a scratch-resistant coating. It is also available in virtually all prescription ranges and lens styles (*Drew, 1990, p. 81; Younger, 2017*). There is also a new manufacturing process that has produced a lens from Optima which has unparalleled clarity by reducing bi-refringence, or stress, in the lens during manufacture. They call this version of polycarbonate *Resolution*. Polycarbonate is also readily available in a great range of powers as a

stock or surfaced lens with multi-layer anti-reflection coating (*Karp, L & T; 2003*). With a lens of this quality readily available, it is no wonder that Prevent Blindness America claims that 90% of all ocular injuries are preventable (*Prevent blindness, 2017*).

In recent years the optical industry has been besieged with advertising for a new lens material named Trivex, which also goes by the names Phoenix and Trilogy. Most of the advertising promotes this lens materials' substantial impact resistance along with its other properties. However, Chou and Hovis (2006) of the University of Waterloo School of Optometry proved that the impact resistance of the Trivex material (in the form of Phoenix) was closer to the impact resistance of 3mm CR-39 than polycarbonate. Their study showed the lenses composed of the Trivex material failed when impacted at speeds ranging from 50 m/s for 2mm lenses with scratch coating and multi-layer anti-reflective coatings to 63 m/s for 3mm lenses with only scratch coating. They then used the same equipment and impact missile and could not break any 2mm polycarbonate lenses at speeds up to 100 m/s! Chou and Hovis also claim that polycarbonate is usually quoted at breaking at speeds of 180 to 270 m/s – a huge difference indeed!

One caveat on impact resistance for *all* lenses is that any type of coating weakens the lens and reduces its impact resistance. The typical scratch coating weakens a lens and a multi-layer anti-reflective coating weakens a lens even further. This should be kept in mind by the optician when recommending lenses for specific impact situations like industrial safety lenses or sport protective goggles (McGorin, 2006; McLean, 2006).

CONCLUSION

So far, we have identified and defined our professional liability problem, investigated the literature, learned of the many legal aspects to professional liability and delved into lens materials. Many of the myths prevalent in the optical industry have also been exposed in this report. Part two of this report will focus on interesting statistical data, draw conclusions from that data and most importantly, provide extensive guidance to the optician in the form of an approach to minimize their liability as they perform their vital role in vision care on a daily basis.

Note: This course is offered as an informative piece of research. Neither the NAO nor the author are legal experts in liability. The individual optician should consult with a lawyer to seek specific advice on these topics in specific situations.

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