# Journals Represented

Year Book Medical Publishers subscribes to and surveys almost 850 U.S. and foreign medical and allied health journals. From these journals, the Editors select the articles to be abstracted. Journals represented in this YEAR BOOK are listed below.

Acta Ophthalmolgica
American Journal of Ophthalmology
Annals of Ophthalmology
Archives of General Psychiatry
Archives of Neurology
Archives of Ophthalmology
Binocular Vision
British Journal of Ophthalmology
British Journal of Plastic Surgery
British Journal of Radiology
Canadian Journal of Ophthalmology
Cancer
Cornea
International Ophthalmology Clinics
Investigative Ophthalmology and Visual Science
Japanese Journal of Ophthalmology
Journal of the American Medical Association
Journal of Cataract and Refractive Surgery
Journal of Neurology, Neurosurgery and Psychiatry
Journal of Pediatric Ophthalmology and Strabismus
Journal of Refractive Surgery
Klinische Monatsblatter fur Augenheilkunde
Mayo Clinic Proceedings
Medical Journal of Australia
Neurology
New England Journal of Medicine
Ophthalmic Research
Ophthalmic Surgery
Ophthalmologica
Ophthalmology
Orbit
Retina Journal of Retinal and Vitreous Diseases
Survey of Ophthalmology

# Publisher's Preface

We are delighted to welcome Peter R. Laibson, M.D., and his associates, Raymond E. Adams, M.D., Juan J. Arentsen, M.D., James J. Augsburger, M.D., William E. Benson, M.D., Elisabeth J. Cohen, M.D., Ralph C. Eagle, Jr., M.D., Joseph C. Flanagan, M.D., Leonard B. Nelson, M.D., Robert D. Reinecke, M.D., Robert C. Sergott, M.D., and Richard P. Wilson, M.D., as editors of the YEAR BOOK OF OPHTHALMOLOGY.

This team is carrying on the tradition of distinguished editorial direction for the YEAR BOOK commencing with this 1989 edition. We congratulate them and extend our appreciation for their superb work.

# Introduction

This first issue of the YEAR BOOK OF OPHTHALMOLOGY from Wills Eye Hospital has each specialty chapter introduced by a special article written by the Associate Editor in charge of that section. These introductory sections are worthwhile reading, as they highlight what each Associate Editor believes is important in his or her field for the year. For example, Dr. Augsburger writes on the randomized clinical trial for patients with choroidal and ciliary body melanomas, Dr. Benson writes on postsurgical endophthalmitis, and Dr. Eagle discusses the genetics of retinoblastoma.

Several Associate Editors have gone somewhat afield and written on socioeconomic topics, such as Dr. Reinecke on the Hsiao Report concerning resource-based relative value scales. It is essential that every ophthalmologist know about the Hsiao Report and how it may affect their practice.

Dr. Sergott has described an ophthalmic subspecialty in transition in his review of neuro-ophthalmology. It may become more of a surgical subspecialty with procedures such as optic nerve decompression. Other Associate Editors review their specific fields with a look to the future, particularly Dr. Flanagan discussing use of the contact laser in oculoplastic surgery. The wide variety of new developments in all of ophthalmology makes it almost impossible for any single editor or even several editors to cover the entire field satisfactorily. The YEAR BOOK OF OPHTHALMOLOGY, now edited at Wills Eye Hospital, hopes to provide you with a broad view of general and specialty ophthalmology, selecting from the past what is considered important for the present and speculating what may be useful or necessary in the future. Our expanding field is becoming more and more difficult to grasp, but through this YEAR BOOK, we hope to provide a useful synopsis of the current literature as well as a glimpse of the future.

**Peter R. Laibson, M.D.**

# Table of Contents

The material in this volume represents literature reviewed through December 1988.

# 1 Cataract

## Cataract Review: 1988

Raymond E. Adams, M.D.
*Cherry Hill, New Jersey*

The following highlights of 1988 will be discussed in this introduction: continuous capsulotomy; water-assisted cataract removal; posterior chamber intraocular lenses; the aging eye; cataract formation; and the Snellen visual acuity test. We also relate a fairy story.

### Continuous Capsulotomy

The popular can-opener capsulotomy opening evolved from the Kelman Christmas tree and earlier primitive techniques. These were fairly safe, simple, and effective procedures but not problem free. The Neuhann Capsulorhexis (1) technique allows for a continuous, circular opening in the anterior lens capsule. This has an advantage only in phacoemulsification, not in planned extracapsular cataract extraction. After the lens is emulsified, the smooth circular edge of the anterior capsule provides controlled in-the-bag intraocular lens implantation and a lessened postoperative likelihood that the haptic will slide out of the bag. Also, a capsulorhexis opening lacks multiple tears, which can extend to the posterior capsule during hydrodissection or manipulation.

During phacoemulsification the smaller continuous anterior capsule opening may protect the corneal endothelium by shielding the cornea from direct ultrasonic activity or lens fragments. Phacoemulsification combined with a small capsulotomy opening is nicknamed endocapsular or intercapsular phacoemulsification.

Capsulorhexis is challenging to learn and cannot always be completed. Success is dependent on the elasticity and thickness of the anterior capsule. Finesse with a bent 25-gauge needle or fine-toothed forceps may be required. Nevertheless, this is a good technique and I recommend it. Be prepared to convert to the can-opener capsulotomy when the capsule rips out of control.

### Water-Assisted Cataract Removal

Separation of splitting of the lens structure with water is called hydrolamellar dissection. The capsule, cortex, or nucleus separates by this simple procedure. Briefly, after performing the capsulotomy, saline is forced under the anterior capsule with a 2-ml syringe and a 30-gauge cannula. The result is a splitting of the posterior tissue planes. Some envision this to be a "cushioning nest" of posterior cortex. This is turn covers and protects the posterior capsule during phaco or planned extracapsular extraction (2).

Hydrodissection also loosens the more dense lens tissue to permit lens rotation for emulsification or lifting the lens edge out of the capsular bag. This practice may prevent one of the most grave complications of cataract extraction (posterior capsule rupture with loss of the nucleus into the vitreous cavity).

London's Moorfield's Hospital has used hydrodissection for planned extracapsular cataract extraction. I routinely use hydrolamellar dissection before phaco and find it helpful in most types of cataracts. However, be careful not to use excessive force. This can result in blow-out of the lens or extensive splitting of the capsule.

## Posterior Chamber Intraocular Lens Without Capsular or Zonular Support

Intraocular lens (IOL) suturing resurfaced in 1988 (3). Aphakic patients with torn or missing capsules or zones may have the IOL sutured to the sclera in the ciliary sulcus with nonadsorbable 10–0 Prolene. This technique was carried out in six patients in whom contact lenses failed and anterior chamber IOLs were countraindicated.

The potential risks of this procedure are intraoperative hemorrhage, permanent scleral fistulas, vitreous disturbance after anterior vitrectomy with cystoid macular edema or retinal detachment, difficulty in assuring the exact placement of the haptics, calculation of the lens power as related to lens position, tilting or rotation of the optic inducing astigmatism or altering the effective lens power, and knot slippage leading to subluxation or dislocation.

The potential problems of sutured ciliary sulcus IOLs must be compared to parallel complications with anterior chamber IOLs. Anterior chamber lenses have a higher incidence and great variety of complications compared with the standard in-the-bag posterior chamber lens.

Using the suturing technique, a small group of successful posterior chamber implantations has been carried out in aphakic patients when combined with corneal transplantation, anterior segment reconstruction, and postlensectomy/vitrectomy.

## The Aging Eye

Results of Olbert's (4) study clearly indicate a relatively steady decrease in anterior chamber depth from age 30 on, with a corresponding increase in lens thickness. In women the anterior chamber depth as measured from the anterior surface of the lens was 0.19 mm smaller than that in men.

Patients with acute angle-closure glaucoma have very shallow or absent anterior chambers (5). Yearly examination of the anterior chamber depth and lens thickness is recommended in all potential high-risk patients. Hypermetropic patients and elderly women appear more frequently to have angle-closure glaucoma.

Annual echographic examination (A-scan) of the lens thickness and anterior chamber depth can be used to predict impending acute angle-closure glaucoma. Preventive measures can then be brought into play before an attack occurs.

Another question is whether the eye shortens with old age. Fledelius concurs that, with increasing age, lens thickness increases and the anterior chamber depth decreases, but he favors eye size stability in old age (5).

## Cataract Formation

The human lens has been likened to a "biologic dosimeter for radiation exposure in situ" (6). Attempts to relate cataract formation with various metabolic, external, or other means has always interested ophthalmologists. In this age of preventive medicine, the prevention of cataract formation and/or the dissemination of information to patients takes on medical, moral, and legal ramifications.

Exposure to sunlight or ultraviolet radiation has been suggested as a cause of cataract formation. Strongly supporting this theory is the work of Taylor et al. (7), who report on Chesapeake Bay watermen and cataract development. This group found "a clear association between the degree of ultraviolet B exposure and the risk of cortical cataracts. The subjects with cortical cataracts had a greater exposure to ultraviolet radiation from the age of 16 on than those without cortical cataracts." A 3.3-fold increased risk for cortical cataracts was observed in the group exposed to ultraviolet B, but no association was found with nuclear cataracts or between ultraviolet A exposure and nuclear or cortical cataracts.

Ultraviolet A (400–320 nm) induces sun tanning, whereas ultraviolet B (320–290 nm) causes sunburn, blistering, and skin cancer; ultraviolet C (290–100 nm) does not penetrate the earth's surface (8).

Taylor et al.'s conclusions based upon their observation of the Chesapeake Bay watermen were that "it is prudent to protect the eyes from unnecessary exposure to the ultraviolt B" (7). Ultraviolet energy varies markedly during the day and is highest in the summer between 10 AM and 2 PM. Exposure can be reduced ("half") by simply wearing a hat with a brim and ("5%") ordinary sunglasses; however, a set of close-fitting ultraviolet-absorbing lenses gives maximal protection.

Microwave and ionizing radiation (9) most commonly causes anterior or posterior subcapsular lenticular opacities. This may be related to the deformation of heat-labile enzymes (such as glutathone peroxide) or thermoelastic expansion, through which pressure waves in the aqueous humour cause direct physical damage to the lens cells. Ionizing radiation (x-irradiation and gamma rays) usually cause the posterior subcapsular cataract.

Various vitamins are thought to influence the antioxidant status and reduce the risk of cataract formation. They are vitamin C, vitamin E, and the carotenoids. The hypothesis is that the lens antioxidant defense may play a role in cataractogenesis (10).

The calcium content of the lens and its possible imbalance in cataract development has been studied for decades. There appears to be a marked increase in calcium in mature cataracts. However, diseases characterized by prolonged hypocalcemia may induce cataract development over time. An example is primary hypoparathyroidism. Unexpectedly, the cataract patients had an increased aqueous humor concentration of magnesium relative to the serum concentration (11).

Cataract development was investigated in an HMO population who were considered to be more health conscious and less apt to smoke cigarettes. Cataractogenic considerations included diabetes mellitus, ocular trauma, roentgen ray irradiation, ultraviolet light, myopia, and corticosteroid therapy, as well as nutrition and family history. However, the conclusion was that the influence of these factors is poorly understood and may sometimes be challenged (12). In this series, 50% of the study group had sustained blunt trauma, or used steroids or had inflammation or diabetes mellitus. The latter patient was 3.5 years older than the nondiabetics at the time of cataract extraction.

## A Fairy Story

Each year health care providers are under greater review by powerful federal regulatory agencies in an attempt to ensure compliance with established Medicare guidelines. Donald M. Berwick, M.D. (13) contrasts this problem to industry:

"Imagine two assembly lines, monitored by two foremen.

"Foreman 1 walks the line, watching carefully. 'I can see you all,' he warns. 'I have the means to measure your work, and I will do so. I will find those among you who are unprepared or unwilling to do your jobs, and when I do there will be consequences. There are many workers available for these jobs, and you can be replaced.'

"Foreman 2 walks a different line, and he too watches. 'I am here to help you if I can,' he says. 'We are in this together for the long haul. You and I have a common interest in a job well done. I know that most of you are trying very hard, but sometimes things can go wrong. My job is to notice opportunities for improvement—skills that could be shared, lessons from the past, or experiments to try together—and to give you the means to do your work even better than you do now. I want to help the average ones among you, not just the exceptional few at either end of the spectrum of competence.'

"Which line works better? Which is more likely to do the job well in the long run? Where would you rather work?"

Foreman 1 relies on inspection to improve quality because quality is best achieved by discovering "bad apples" and removing them from the work force through "recertification," "deterrence" through litigation, and the search for "outliers"—". . . statistics far enough from the average that chance alone is unlikely to provide a good excuse." This game is not fun, and the workers are afraid and angry.

"The Japanese learned first—from American theorists, ironically—that there were far better ways to improve quality, and the result is international economic history." Nevertheless, in 1988, ophthalmology responded to "Foreman 1" with added instrumentation to prove that we are not the "bad apple"! Paul P. Lichter (14) writes, "I am concerned that when we devise some form of test with a numeric value to substitute for our clinical judgment, we open the door to bureaucratic decision on whether or not cataract surgery is justified." The use of the lens opacity meter, contrast sensitivity devices, and glare tests are such examples.

## Snellen Is Out, Sine Wave Is In

The Snellen visual acuity test is a less standardized test than once believed. Letter charts pose perceptual difficulties (different letters, i.e., "L" vs. the "E"), and the number of letters per line (crowding phenomenon), luminance, and patient literary or cognition skills influence test results. Arthur P. Ginsburg, PhD (15) explains that the use of the Snellen visual acuity test is based on historical precedent as there is "little or no functional relationship between Snellen acuity and everyday visual performance."

The use of sine wave gratings can overcome the limitations of the Snellen visual acuity test and are the most sensitive visual targets, being easier to administer than low-contrast letter tests. Audiologists learned that pure tones are the best targets with which to test hearing.

Neumann et al. (16) studied 78 patients using a Snellen eye chart outdoors in the central Florida mid-summer sunlight. Of the cataractous eyes, almost 70% had visual acuities of at least 2 Snellen lines worse when measured outdoors. The investigators concluded, "It is clear that indoor Snellen visual acuity cannot be used as the sole criterion for visual impairment. Cataract patients often present with complaints of disabling glare yet have good visual acuities when tested outdoors."

When the illumination of the Snellen chart was controlled with a light meter and a 1.5-mm pin-hole to control pupil size, Marmor Gawande (17) found that modest refractive degradation of acuity in normal persons results in a broad loss of contrast sensitivity.

Sjöstrand and Hard (18) stated that the major effect of glare in cataract patients is the contrast-lowering effect and is weakly correlated with Snellen visual acuity. Zulauf and Flammer (19) suggested that visual tests use green color and horizontally oriented gratings. Blanchard (20) uses Vistech charts for distant and near-vision testing as ". . . it rivals the sensitivity of single (intraocular) pressure measurements in selecting those at risk for glaucoma." The use of these charts for health screening fairs was recommended.

In 1988 ophthalmology responded to the federal regulators' demand for documentation of visual loss in cataract. The result is the emergence of new technology to appease the government and at the same time offer advancement of visual testing.

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**Effect of Ultraviolet Radiation on Cataract Formation**

Taylor HR, West SK, Rosenthal FS, Muñoz B, Newland HS, Abbey H, Emmett EA (Johns Hopkins Univ)

*N Engl J Med* 319:1429–1433, Dec 1, 1988 1–1

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There are photobiologic and biochemical reasons why exposure to sunlight may cause senile cataracts, but firm epidemiologic evidence is lacking. The occurrence of cataract was related to levels of annual ocular exposure of 838 watermen (mean age, 53 years) from age 16. Exposure was calculated from the occupational history and laboratory and field measurements of solar exposure. All worked on Chesapeake Bay.

The median annual ocular exposure was 0.02 Maryland sun year (the maximum of 0.09 would represent work on the water all day each day of the year without a hat or glasses). Thirteen percent of the men had some cortical lens opacity and 27% had some nuclear opacity. Ultraviolet B (UBV) exposure was significantly greater than expected for watermen with cortical opacities. For those with cortical opacities excess exposure occurred annually after age 15 years. Those whose annual average exposure was in the upper quartile had a relative risk of cortical cataract of 3.3.

A clear relationship between UVB exposure and the risk of cortical cataract was evident in this study of watermen. No such association was found for nuclear cataract or for UVA exposure. Experimentally, the lens is most vulnerable to radiation in the UVB band, and it would seem wise to avoid unnecessary exposure to UVB. In addition to wearing sunglasses with UBV-absorbing lenses at times of peak exposure, a hat with a brim is helpful.

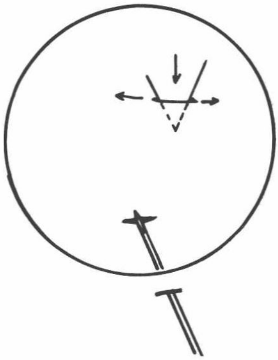
### The Neuhann Capsulorhexis: A Safe Technique for All-in-the-Bag Implantation

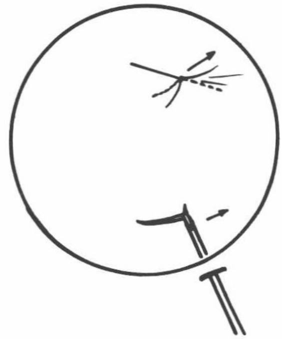
Haefliger E, Neuhann Th (Kantonsspitals Liestal, München; Krankenanstalt Rotes Kreuz, Munich, West Germany)

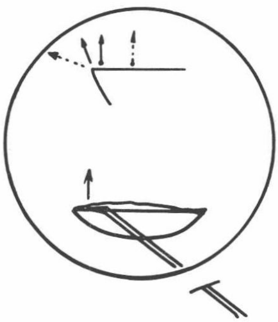
*Klin Monatsbl Augenheilkd* 192:435–438, 1988 1–2

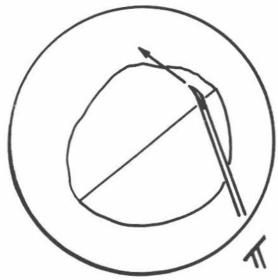
Previous histologic studies of pseudophakic cadaver eyes have shown poor correlation between the actual postoperative position of anterior lens capsule openings and those intended intraoperatively by the surgeon. It has been suggested that the position of the lens capsule opening may be an important factor in the outcome of intraocular lens implantation. However, this assumption has been difficult to prove because of the great variation in postoperative lens capsule opening positions. Moreover, this variability makes it impossible to demontrate the advantages of all-in-the-bag lens implantation over sulcus fixation.

With conventional techniques, the stability of the peripheral edge of the anterior lens capsule is lost after excavation of the lens material. The Neuhann capsulorhexis creates a continuous circular opening in the anterior lens capsule that provides maximum stability in the zonulolenticular diaphragm, even after the lens material has been excavated, thus facilitating control of the lens haptic for in-the-bag implantation. Capsulorhexis reduces the morphological variability of the anterior capsule and allows easy confirmation of the position of the lens opening both during and after operation. A more uniform position of lens loops will enable a more









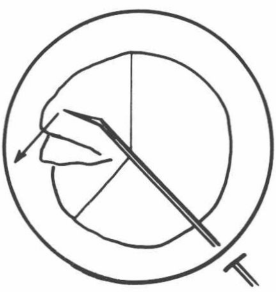


**Fig 1–1 (upper left).**—The point of a burr-free needle is inserted through the anterior lens capsule about 3 mm from the center. The diagram demonstrates the vectorial forces required to obtain a linear cut without creating a radial cut.

**Fig 1–2 (upper right).**—The linear incision is extended by lifting the lens capsule, using a tenting motion, with the sharp side of the needle facing upward from underneath the lens capsule.

**Fig 1–3 (center left).**—As soon as the central part of the lens capsule starts to camber, the capsule can be torn by pushing (the needle) forward along the periphery of the camber. In the diagram, the *dotted line* indicates the radial tear that will occur if the point of the needle is inserted too close to the center.

**Fig 1–4 (center right).**—The capsule tear is guided through the vector field created by the cambering central portion of the lens capsule.

**Fig 1–5 (lower left).**—The lens capsule is torn along the lower circumference of the camber. Toward the end of the tear trajectory, the point of the needle usually needs to be repositioned several times.

(Courtesy of Haefliger E, Neuhann Th: *Klin Monatsbl Augenheilkd* 192:435–438, 1988.)

valid comparison between various available techniques of intraocular lens implantation.

Instructions for performing the Neuhann capsulorhexis and an explanation of the mechanical principles on which it is based are given in Figures 1–1 through 1–5. The technique is as follows:

*Technique.*—The point of a burr-free needle is inserted through the anterior lens capsule about 3 mm from the center. The diagram (Fig 1–1) demonstrates the vectorial forces required to obtain a linear cut without creating a radial cut. The linear incision is extended by lifting the lens capsule using a tenting motion, with the sharp side of the needle facing upward from underneath the lens capsule (Fig 1–2). As soon as the central part of the lens capsule starts to camber, the capsule can be torn by pushing (the needle) forward along the periphery of the camber. In Figure 1–3, the *dotted line* indicates the radial tear that will occur if the point of the needle is inserted too close to the center. The capsule tear is guided through the vector field created by the cambering central portion of the lens capsule (Fig 1–4). The lens capsule tear is continued along the lower circumference of the camber (Fig 1–5). Toward the end of the tear's trajectory, the point of the needle usually needs to be repositioned several times.

▶ With this technique a more circular anterior capsular lens opening may be facilitated, which should allow better haptic placement in the sac. The surgery appears simple in the diagrams, but this is not always the case. It is worthwhile, however, to try this procedure.—P.E. Adams, M.D.

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**Retinal Phototoxicity From the Operating Microscope: The Role of Inspired Oxygen**

Jaffe GJ, Irvine AR, Wood IS, Severinghaus JW, Pino GR, Haugen C (Univ of California, San Francisco)

*Ophthalmology* 95:1130–1141, August 1988 1–3

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The threshold exposure duration for producing photic retinal damage depends on many factors, including wavelength and intensity of the incident light, and body temperature. Arterial oxygen tension ($PaO_2$) may also be important. Light-induced damage from an operating microscope may be potentiated by excess inspired oxygen provided during general anesthesia or via nasal cannula during local anesthesia. Experiments were conducted to determine if retinal damage produced by the light source of the operating microscope is related to inspired oxygen concentration ($FiO_2$).

Phakic rhesus monkeys were used. One eye of each animal was exposed to light under conditions of 99% $FiO_2$ and the other was exposed under 21% $O_2$. Three of 4 locations on each retina were exposed to light for durations of 1½ to 20 minutes per exposure. Fundus photographs and fluorescein angiograms were obtained 24–72 hours after exposure. Retinal phototoxic lesions were produced after an average of 5 minutes of light exposure under 21% and 99% $O_2$. Oxygen potentiated the light damage clinically and histologically. In both conditions, lesion size was directly related to the duration of light exposure. Lesions near threshold produced with 99% $FiO_2$ were 1.6–6.1 times larger than the corresponding lesions formed with 21% $FiO_2$. Histologic damage was more severe in lesions produced under high $O_2$ conditions. Retinal repair occurred in lesions produced under both high and low $O_2$ conditions. Photoreceptor regeneration was almost complete by 18 weeks, whereas retinal pigment epithelial recovery took at least 22 weeks.

These findings have important implications for clinical practice. The operating microscope can produce retinal photoxicity rapidly, and $O_2$ given during ophthalmic procedures can potentiate the damage if appropriate precautions are not taken.

▶ The slow surgeon using an operatory microscope may endanger ocular tissues in several ways. These may include lengthy ocular hypotension triggering expulsive choroidal hemmorhage, prolonged irrigation with "balanced" saline solution producing corneal endothelial damage, and extended opening of the wound increasing exposure to infection.— R.E. Adams, M.D.

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**Nd:YAG Laser Shock Waves in Artificial Eyes**

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*Ophthalmologica* 196:210–215, 1988 1–4

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Laser pulses cause breakdown of material because large amounts of energy are concentrated in a very small volume. However, optical breakdown in the eye is accompanied by destructive mechanical effects caused by phase changes and shock waves. The shock waves are not restricted to the point of origin but expand throughout the eye. They also strike healthy structures. The shock waves can be felt even at the back of a patient's head during treatment. Shock wave amplitudes produced by single and multiple pulses of 1.064 μm Nd:YAG laser energy in artificial eyes of various lengths were measured.

As the laser pulse energy was increased the shock waves of higher amplitudes appeared 0.1 msec later for a single pulse than for a pulse sequence. The effects observed were not caused by mechanical resonance. Peak pulse amplitudes in the artificial eyes of different length were found to increase linearly as a function of the energy transferred into the eye. The peak amplitudes of pulse sequences were only half of those for single pulses of comparable energy. In laser surgery these sequences may be preferable if they achieve the same effect.

The recorded waveforms of shock waves in artificial eyes of different lengths are not caused by reflections or resonances. All curves were found to be similar. Their peak amplitudes appeared after the first millisecond and decreased rapidly afterward. The visible effects of optically induced breakdown in solid material have previously been shown to differ from those in water, but no differences in the shock wave patterns in the 2 media were found in this study. Peak pulse amplitudes in artificial eyes of different lengths increased linearly as a function of the energy transferred into the eyes.

▶ The incidence of retinal detachment has declined with the shift to extracapsular cataract surgery. To maintain this impressive trend, posterior capsulotomies should be performed when capsule opacification requires laser energy of less than 2.0 mJ, at least in the experimental situation.—R.E. Adams, M.D.

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**Use of Photographic Techniques to Grade Nuclear Cataracts**

West SK, Rosenthal F, Newland HS, Taylor HR (Johns Hopkins Univ)

*Invest Ophthal Vis Sci* 29:73–77, January 1988 1–5

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Photographing cataracts allows for documenting lens opacities objectively and grading them using expert graders or densitometric analysis. The feasibility and reliability of 2 photographic methods of grading nuclear opacities were examined. Forty-one eyes were photographed using a regular Topcon SL-5D photo slit-lamp and a Topcon SL-45 camera. The photos were graded against a set of 4 standard photographs of increasing nuclear opacification, and densitometric analysis was done on both sets.

Agreement between the results of clinical slit-lamp examination and gradings of photos was only fair. Interobserver reliability was high with photos taken using the photo slit-lamp, and the severity grading of these photos correlated well with densitometric analyses.

Photodocumentation of nuclear opacities seem feasible. The photo slit-lamp is much more reliable and reproducible than clinical examination is, particularly when the latter relies on a written description. Epidemiologic field surveys of cataracts can use photographs of the lens nucleus obtained by photo slit-lamp and a standard set of photographs of nuclear opacity.

▶ Cataract grading is simple yet difficult to document clinically. Slit-lamp photodocumentation is accurate and has reliable interobserver grading. Photography offers a means of grading cataracts in office, clinic, or epidemiologic surveys.—R.E. Adams, M.D.

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**The Relationship Between Indoor and Outdoor Snellen Visual Acuity in Cataract Patients**

Neumann AC, McCarty GR, Steedle TO, Sanders DR, Raanan MG (Neumann Eye Inst, DeLand, Fla; Chicago)

*J Cataract Refract Surg* 14:35–39, January 1988 1–6

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Glare may be described as a contrast-lowering effect of light that enters the eye so as to inhibit distinct vision. Light is scattered in the eye by opacities in the lens, vitreous, or other clear media. The authors compared Snellen visual acuities as measured indoors and outdoors in 78 patients with 106 cataractous eyes.

About three fourths of cataractous eyes had Snellen acuities of 20/40 or better when tested indoors, whereas fewer had one third had acuities this good when tested outdoors facing the sun. Three eyes (2.8%) had acuity worse than 20/80 indoors compared with 29.2% when tested outdoors. Ten eyes had outdoor acuities worse than 20/200. More than two thirds of eyes had outdoor acuities at least 2 Snellen lines worse than indoor values. The median difference between indoor and outdoor acuity was 3 Snellen lines (table).

Indoor Snellen acuity should not be the sole criterion for visual impairment in cataract patients, who often complain of disabling glare but have good indoor acuity.

Glare testing may be used to ascertain the need for surgery. Both the Miller-Nadler glare tester and the brightness acuity tester were developed using actual outdoor vision testing of cataract patients.

Summary of Snellen Line Differences in Indoor and Outdoor Best Corrected Visual Acuity

| | Number of Snellen Lines* | | |
|---|---|---|---|
| Cataract Type | Number | Median | Range |
| Pure nuclear sclerosis | 30 | 2 | −3 to 6 |
| Nuclear sclerosis + posterior subcapsular opacities | 41 | 3 | 0 to 8 |
| Other cataractous combinations | 35 | 3 | −2 to 7 |
| All eyes | 106 | 3 | −3 to 8 |

*Negative values indicate that visual acuity was better when measured outdoors. Positive values indicate decreases in visual acuity when measured outdoors.

(Courtesy of Neumann AC, McCarty GR, Steedle TO, et al: *J Cataract Refract Surg* 14:35–39, January 1988.)

▶ When is the patient ready for cataract surgery, and when is surgery justified? Cataract assessment in the office may not correlate with the patient's functional visual impairment, which interferes with occupation or life-style. The authors use an objective method to compare indoor vision and outdoor vision with glare disability to justify the need for cataract surgery.— R.E. Adams, M.D.

## Comparison of the SRK II Formula and Other Second Generation Formulas

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*J Cataract Refract Surg* 14:136–141, March 1988 1–7

The SRK power formula has become the most widely used means of calculating implant power. It is, at worst, clinically equivalent in accu-