

# Editorial

## Disinfection of Goldmann Tonometer After contamination with Hepatitis C Virus

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- n Hepatitis C Virus is the most chronic blood borne infection.
- n 1988 - 1994 ----- 3.9 million US citizens (1.8%) have been infected with HCV.
- n Most of these persons are chronically infected and might not be aware of their infection, because they are not clinically ill and may serve as a source of transmission to others
- n Current studies have shown that up to 20% to 40% of chronically infected hepatitis C patients have no known risk factors for hepatitis C virus infection.
- n Risk factors for transmission of hepatitis C virus
  - n Exposure to blood products by means of intravenous drug use, transfusions, needle sticks, and maternal—fetal transmission.
- n However, the isolation of hepatitis C virus from tear fluid and aqueous humor raises the possibility of transfer of hepatitis C virus during the course of an ophthalmologic examination, that is, Goldmann tonometry and trial contact lens fitting.
  
- n Certain studies have discovered that the concentration of hepatitis C virus in human tear fluid is independent of the severity of hepatitis infection.
- n Other studies have reported that hepatitis C virus RNA is found in higher concentrations in tear fluid compared with plasma
- n Approximately 50% of hepatitis C virus seropositive patients are currently ambulatory and asymptomatic.
- n The possibility remains that these asymptomatic hepatitis C virus Seropositive patients may be examined in an eye care professional's office and can be a potential source of hepatitis C virus transmission.

This study tested the protocol of the Centers for Disease Control and prevention guidelines for disinfection of Goldmann tonometer tips after exposure to human immunodeficiency Virus.

### METHODS

- n Two separate experimental protocols were used. in the first, 5 *ul* of human hepatitis C virus was pipetted on new Goldmann tonometer tips and allowed to air-dry for 1 hour.

n For the second protocol, 3.5 ul of human hepatitis C virus was pipetted on tonometer tips and allowed to air—dry **for 20 minutes.**

n Disinfection techniques included:

- 1) Dry **gauze 5-second** wipe,
- 2) 5-second **wipe** with 70% **isopropyl** alcohol pad
- 3) Cold water wash 10 second,
- 4) 15 second povidone iodine 10%
- 5) 3% Hydrogen Peroxide 5 minutes soak followed by 5 second cold water wash
- 6) 5 minutes 70% isopropyl ACL. followed by 5 second cold water wash

## RESULTS

n **Percentage of hepatitis C virus RNA remaining after disinfection.:**

- n **dry gauze wipes 95.65%,**
- n **isopropyl alcohol 5 second wipes 88.91%,**
- n **cold water wash 4.78%,**
- n **povidone iodine 10% 5-second wipes 0.72%,**
- n **hydrogen peroxide soak then cold water wash 0.07%,**
- n **isopropyl alcohol soak and cold water was 0.02%.**

## DISCUSSION

n **Failure to efficiently disinfect Goldmann tonometer tips could, in theory, represent a possible mode of Hepatitis C virus transmission.**

n **According to the study data, a povidone iodine 10% wipe and 70% isopropyl alcohol or .3% hydrogen peroxide soak removed significantly removed hepatitis C virus RNA than a 70% isopropyl alcohol wipe.**

## Conclusion

**5 minutes soak in 3%hydrogen peroxide or70% isopropyl alcohol soak followed by cold water resulted in the greatest reduction in the HCV RNA.**

# Morning Round

## Swimming goggles suck

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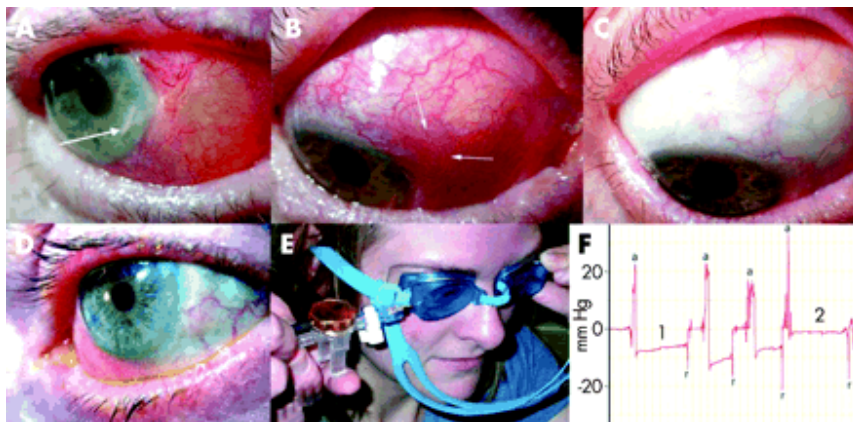
We present a complication arising from the use of swimming goggles in a patient with glaucoma drainage blebs.

### CASE REPORT

A 73 year old white man with poorly controlled primary open angle glaucoma underwent routine trabeculectomy with adjunctive 5-fluorouracil to the right eye, followed by the same procedure to the left eye 6 weeks later. Preoperatively the intraocular pressures were 28 mm Hg bilaterally and cup: disc ratios were 0.95 right, 0.8 left. Early postoperative intraocular pressure (IOP) in the right eye was low (5 mm Hg at weeks 2 and 6), but uncomplicated. The [recovery](#) of the left eye was uneventful, and at 3 months the IOPs were 10 mm Hg right eye, 12 mm Hg left.

However, at 4 months the patient presented with discomfort and redness in the right eye. A large extension of the bleb had formed at the nasal limbus, with an associated corneal dellen (fig 1A and B). The IOP had increased in the right eye, which was treated with a needling procedure and 5-FU injection, repeated 3 weeks later. Subsequently the bleb extension receded and the previously elevated right nasal conjunctiva was found to be firmly adherent to the underlying sclera (fig 1C). He re-presented 7 months after the initial surgery with redness and swelling, this [time](#) in the left nasal conjunctiva (fig 1D). At this point the patient mentioned that he was a keen swimmer and inquired whether his problem could have been caused by the use of swimming goggles. He had resumed

regular swimming 2 weeks before developing the right eye complication, then stopped. He had resumed again 3 months before developing the left.



**Figure 1** (A) (B) Right eye at 4 months postoperatively showing corneal dellen and nasal bleb extension (A) and the adjoining isthmus (B) with arrows at each end. (C) Regression of the right accessory bleb after needling, 5-fluorouracil, and topical steroids. (D) Left eye at 7 months postoperatively with smaller and slightly inflamed nasal accessory bleb. (E) Pressure transducer setup measuring "intragoggle" pressure using AD Instruments Powerlab ([www.adinstruments.com](http://www.adinstruments.com)) and IOP transducer (gold disc). (F) Transducer recording showing several goggle applications (positive pressure, "a" labels) and the transient negative pressure spikes produced on removing them ("r" labels); In area 1 of the trace, the goggles were overtight and in area 2 they were comfortable.

With this in mind, we set out to investigate the pressure changes inside swimming goggles. With a pressure transducer fixed to one eyepiece (fig 1E\*), we recorded a comfortable range of  $-1$  to  $-5$  mm Hg, discomfort over  $-10$  mm Hg and a maximum suction of  $-44$  mm Hg. Upon removing the goggle, a transient negative pressure spike was also produced (fig 1F\*). Given these observations and the timing of the clinical events, we surmise that the patient's bleb extensions were plausibly consequent upon his aquatic activities.

## COMMENT

Previous reports of barotrauma sustained while wearing overtight goggles include suction petechiae<sup>1</sup> and changes in the eyelid skin,<sup>2</sup> but we are not aware of any information concerning the effects of swimming goggles on glaucoma drainage blebs. When goggles are applied, firm pressure displaces a small volume of air and creates a negative "intragoggle" pressure, the basis by which a seal is maintained. In a person who has undergone trabeculectomy, an increase in the transconjunctival pressure gradient could open up a weakness in the perimeter of the bleb and cause it to extend in the direction of least resistance.

Other experimental work has examined the pressure changes occurring in the mask space during [scuba diving](#).<sup>3</sup> This is a rather different system as the nose is included in the mask, allowing the pressure to be equalized by exhaling through the nose. The eye and periocular structures can be subjected to significant negative pressures if this is not done, but the duration is usually limited by this pressure gradient acting across the tympanic membrane, causing pain and prompting the diver to ascend or equalize. Ocular barotrauma can result in subconjunctival haemorrhage and chemosis, and it has been recommended that patients wait a minimum of 2 months after glaucoma filtering surgery before resuming [scuba diving](#).<sup>4</sup>

We do not believe patients who have undergone trabeculectomy need to cease swimming, but they should be aware that goggles may be able to produce excessive negative pressure if they form a very tight seal.

## References

1. **Jowett NI**, Jowett SG. Ocular purpura in a swimmer. *Postgrad Med J* 1997;**73**:819–20.[\[Abstract\]](#)
2. **Ruban JM**, Mallem M. The eyelid of the competitive swimmer [article in French: La paupiere du nageur de competition]. *J Fr Ophtalmol* 1995;**18**:426–34.[\[Medline\]](#)
3. **Senn P**, Helfenstein U, Senn ML, *et al.* Ocular barostress and barotrauma. A study of 15 scuba divers [in German]. *Klin Monatsbl Augenheilkd* 2001;**218**:232–6 discussion 237–8.[\[CrossRef\]](#)[\[Medline\]](#)
4. **Butler FK Jr.** Diving and hyperbaric ophthalmology. *Surv Ophthalmol* 1995;**39**:347–66.[\[Medline\]](#)

# Clinical Update

## Optic nerve grey crescent

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Another feature in the morphological assessment of the optic nerve head

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**Keywords:** optic disc; glaucoma; neuroretinal rim; parapapillary atrophy; grey crescent

The optic nerve head has been defined as all areas inside the peripapillary scleral ring. Outside this ring in the parapapillary region, various features and abnormalities can be differentiated. In almost all eyes, the retinal pigment epithelium shows some histological irregularities close to the tip of Bruch's membrane at the border of the optic disc. It is the histological equivalent of the alpha zone of parapapillary atrophy which is present in almost all normal eyes. It can usually better be detected at the temporal disc margin than in other parts of the parapapillary region. The beta zone of parapapillary atrophy, present in about 25% of normal eyes, and in a higher percentage of glaucomatous eyes, reflects a complete loss of retinal pigment epithelium cells and an almost complete loss of retinal

photoreceptors. Other abnormalities or changes in the parapapillary region include a hypertrophy of the retinal pigment epithelium mainly at the temporal optic disc border in eyes with a so called conus pigmentosus of the optic nerve head; proliferations of the retinal pigment epithelium such as in retinochoroidal toxoplasmotic scars or after subretinal parapapillary haemorrhages; and melanocytic lesions of the choroid such as choroidal naevi or a malignant choroidal melanoma.<sup>1</sup>

The grey crescent of the optic disc as originally described by Shields<sup>2</sup> is another, mostly unrecognized, feature at the border of the optic nerve head. According to Shields, it is a slate grey crescent within the peripheral tissue of the optic nerve head. In his study, 12 out of 100 consecutive black patients revealed the grey crescent. The grey crescents were usually bilateral and were most often located along the temporal or inferotemporal disc margin. The clinical importance of the grey crescent is that one may erroneously assume that the underlying tissue is not neuroretinal rim but parapapillary tissue. It will lead to a falsely small optic disc and neuroretinal rim area and, consequently, to falsely high measurements of the cup/disc diameter ratios. Additionally, it will markedly influence the assessment of the shape of the neuroretinal rim which normally follows the so called ISNT rule. The latter says that the smallest part of the rim is located in the temporal horizontal disc region, and that usually the widest part of the rim is located close to the inferior optic disc pole.<sup>1</sup>

In their large population based study on the occurrence of the optic disc grey crescent in Iceland, published in this issue of *BJO* (p 36), Jonsson and colleagues found that the grey crescent was present in about 22% of the eyes examined. It was more commonly found in women, in hyperopic eyes, and in eyes without a small parapapillary atrophy. It was associated with a large optic disc, and it was usually located in the temporal region of the optic disc. The occurrence of the grey crescent was statistically unrelated to the prevalence of glaucoma. The authors have to be congratulated for their study and for renewing the interest in the grey crescent and for highlighting its importance for the morphological diagnosis of optic nerve abnormalities and diseases. One may, however, take into account the definition of the grey crescent as used by the authors. They defined the grey crescent as the "occurrence of a pigmented crescent that appeared, utilizing a stereo viewer, to be located on or within the neuroretinal rim tissue—that is, inside the scleral lip of the disc whereby the scleral lip had to be clearly visible peripheral to the crescent." Since the alpha zone of parapapillary atrophy is also characterized by an irregular pigmentation, and because the boundary between the alpha zone and the surrounding tissue usually follows a semi lunar line, partially parallel to the peripapillary scleral ring (scleral lip), one must be aware not to confound the grey crescent with the alpha zone. The difference between both structures is that the alpha zone is located outside of the optic disc and may not be counted as neuroretinal rim, whereas the grey crescent is located inside of the optic disc and may partially or completely be regarded as neuroretinal rim. Not considering the differences between the alpha zone of parapapillary atrophy and the grey crescent will, therefore, markedly influence the morphological analysis of the optic disc.

The question arises what the histological equivalent of the grey crescent may be. Since the grey crescent is relatively dark, it may be associated with retinal pigment epithelium cells. These cells sitting on and forming Bruch's membrane, may partially be located in the optic nerve head region if Bruch's membrane extends internally to the peripapillary scleral ring. Future histological studies of the normal optic nerve head may be directed towards finding the clinical-histological correlate of the grey crescent, differentiating it histologically from the physiological alpha zone of parapapillary atrophy, and giving hints for the rate of the histological occurrence of the grey crescent in normal eyes. Optical coherence tomography may be an additional clinical method to analyze intravitreally the grey crescent and its spatial associations with the surrounding tissues.<sup>3</sup>

## REFERENCES

1. **Jonas JB**, Budde WM, Panda-Jonas S. Ophthalmoscopic evaluation of the optic nerve head. *Surv Ophthalmol* 1999;**43**:293–320.[\[CrossRef\]](#)[\[Medline\]](#)
2. **Shields MB**. Gray crescent in the optic nerve head. *Am J Ophthalmol* 1980;**89**:238–44.[\[Medline\]](#)
3. **Schuman JS**, Wollstein G, Farra T, *et al*. Comparison of optic nerve head measurements obtained by optical coherence tomography and confocal scanning [laser](#) ophthalmoscopy. *Am J Ophthalmol* 2003;**135**:504–12.[\[CrossRef\]](#)[\[Medline\]](#)

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## Epidemiology of the optic nerve grey crescent in the Reykjavik Eye Study

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## ABSTRACT

**Aim:** To establish the epidemiology of the grey crescent in a white population within the age range most susceptible to glaucoma.

**Methods:** Bruce Shields was first to use this term to describe a localized, physiological pigmentation of the optic nerve neuroretinal rim tissue that is distinct from peripapillary pigmentation. An experienced glaucomatologist (KFD) evaluated stereofundus photographs of the participants of the Reykjavik Eye Study (RES)—a random sample from the national population census including [people](#) 50 years and older. 1012 right eyes could be evaluated for grey crescent.

**Results:** The prevalence of grey crescent in the right eyes was 22.0% (95% CI 10 to 25). It was more commonly found in women (27.0%: 95% CI 23 to 30) than in men (17.0%: 95% CI 14 to 21), and was most often located temporally (36.9%), 360° (15.9%), or nasally (15.4%). The spherical equivalent was +1.30 dioptres (D) for those with and +0.80 D for those without grey crescent ( $p = 0.002$ ), respectively. Vertical optic disc diameters were 0.203 v 0.195 units ( $p < 0.001$ ). There was no difference in the prevalence of grey crescent in glaucomatous or non-glaucomatous eyes (OR = 1.05, 95% CI 0.49 to 2.26). The prevalence of a grey crescent was inversely related to the prevalence of peripapillary atrophy ( $p = 0.001$ ).

**Conclusions:** The grey crescent needs to be recognized as a physiological variant in order to avoid falsely labeling eyes as having glaucomatous optic nerve damage.

## REFERENCES

1. **Shields MB.** Grey crescent in the optic nerve head. *Am J Ophthalmol* 1980;**89**:238–44. [\[Medline\]](#)
2. **Gudmundsdottir E** , Jonasson F, Jonsson V, *et al.* "With the rule" astigmatism is not the rule in the elderly. Reykjavik Eye Study: a population based study of refraction and visual acuity in citizens of Reykjavik 50 years and older, *Acta Ophthalmol Scand* 2000;**78**:642–6. [\[CrossRef\]](#)[\[Medline\]](#)

3. **Katoh N** , Jonasson F, Sasaki H, *et al.* Cortical lens opacification in Iceland. Risk factors analysis. Reykjavik Eye Study. *Acta Ophthalmol Scand* 2001;**79**:154–9.[\[CrossRef\]](#)[\[Medline\]](#)
4. **Greenfield DS**, Zacharia P, Schuman JS. Comparison of Nidek 3Dx and Donaldson Simultaneous Stereoscopic Disc [Photography](#). *Am J Ophthalmol* 1993;**116**:741–7.[\[Medline\]](#)
5. **Jonasson F** , Damji KF, Arnarsson A, *et al.* Prevalence of open angle glaucoma in Iceland: Reykjavik Eye Study. *Eye* 2003;**17**:747–53.[\[CrossRef\]](#)[\[Medline\]](#)
6. **Jonasson F** , Arnarsson A, Sasaki H, *et al.* The prevalence of age-related maculopathy in Iceland. Reykjavik Eye Study. *Arch Ophthalmol* 2003;**121**:379–85.[\[Abstract/Free Full Text\]](#)
7. **Klein BEK**, Moss SE, Magli YL, *et al.* Optic disc cupping as clinically estimated from photographs. *Ophthalmology* 1987;**94**:1481–3.[\[Medline\]](#)
8. **Rockwood EJ**, Anderson DR. Acquired peripapillary changes and progression in glaucoma. *Graefes Arch Klin Exp Ophthalmol* 1988;**226**:510–15.[\[Medline\]](#)
9. **Tuulonen A** , Jonas JB, Välimäki S, *et al.* Interobserver variation in the measurements of peripapillary atrophy in glaucoma. *Ophthalmology* 1996;**103**:535–41.[\[Medline\]](#)
10. **Foster PJ**, Buhrmann R, Quigley HA, *et al.* The definition and classification of glaucoma in prevalence surveys. *Br J Ophthalmol* 2002;**86**:238–42.[\[Abstract/Free Full Text\]](#)
11. **Eysteinnsson T** , Jonasson F, Sasaki H, *et al.* Central corneal thickness, radius of the corneal curvature and intra ocular pressure in normal subjects using non-contact techniques: Reykjavik Eye Study. *Acta Ophthalmol Scand* 2002;**80**:11–15.[\[Medline\]](#)
12. **Wang L** , Damji KF, Munger R, *et al.* Increased disk size in glaucomatous eyes versus normal eyes in the Reykjavik Eye Study. *Am J Ophthalmol* 2003;**135**:226–8.[\[CrossRef\]](#)[\[Medline\]](#)
13. **Shields MB**. *Textbook of glaucoma*. 4th ed. Philadelphia: Lippincott Williams and Wilkins, 1997.
14. **Jonas JB**, Budde WM, Panda-Jonas S. Ophthalmoscopic evaluation of the optic nerve head. *Surv Ophthalmol* 1999;**43**:293–320.[\[CrossRef\]](#)[\[Medline\]](#)

# The effect of corneal thickness on intraocular pressure measurement in patients with corneal pathology

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## ABSTRACT

**Background/aim:** To compare intraocular pressure (IOP) measurements taken by the Goldmann applanation tonometer, the Tono-Pen and the ocular blood flow pneumotonometer in eyes with varying central corneal thickness (CCT) due to penetrating keratoplasty (PK), keratoconus (KC), and Fuchs' endothelial dystrophy (FED).

**Methods:** IOP was measured with the Goldmann applanation tonometer, Tono-Pen XL, and OBF pneumotonometer in 127 eyes with the following corneal abnormalities. There were 56 eyes that had undergone PK, 37 eyes with KC, and 34 eyes with FED. CCT was measured using an ultrasound pachymeter after IOP determinations had been made.

**Results:** Mean IOP measurements in all three patient groups were significantly higher when measured by OBF pneumotonometer. Linear regression analysis showed that patients with FED had a significant increase in IOP with increasing CCT of 0.18 mm Hg/10  $\mu$ m using the Goldmann tonometer, 0.15 mm Hg/10  $\mu$ m with the Tono-Pen, and 0.26 mm Hg/10  $\mu$ m with the OBF pneumotonometer. In patients with KC and after PK, linear regression analysis did not show a significant effect of CCT on IOP. A multivariate linear regression model controlling for age, [sex](#), graft size, and patient group, showed that the effect of CCT on IOP for Tono-Pen (0.13 mm Hg/10  $\mu$ m CCT) and Goldmann (0.14 mm Hg/10  $\mu$ m CCT) were significantly lower than for the OBF pneumotonometer (0.26 mm Hg/10  $\mu$ m CCT).

**Conclusions:** This study found that mean IOP measurements using the OBF pneumotonometer were significantly higher than those made using the Goldmann applanation tonometer or Tono-Pen in eyes with a variety of corneal pathologies. The OBF pneumotonometer was found to be most affected by variation in CCT. For all three

instruments, the relation between IOP and CCT depended on the corneal pathology and was greatest for FED.

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## REFERENCES

1. **Doughty MJ**, Zaman ML. Human corneal thickness and its impact on intraocular pressure measures: a review and meta-analysis approach. *Surv Ophthalmol* 2000;**44**:367–408. [[CrossRef](#)][[Medline](#)]
2. **Ayyala RS**. Penetrating keratoplasty and glaucoma. *Surv Ophthalmol* 2000;**45**:91–105. [[CrossRef](#)][[Medline](#)]
3. **Goldberg DB**, Schazlin DJ, Brown SI. Incidence of increased intraocular pressure after keratoplasty. *Am J Ophthalmol* 1981;**92**:372–7. [[Medline](#)]
4. **Goldmann H**, Schmidt T. Uber applanationstonometrie. *Ophthalmologie* 1957;**134**:221–42.
5. **Ehlers N**, Bransen T, Sperling S. Applanation tonometry and central corneal thickness. *Acta Ophthalmol* 1975;**53**:34–43. [[Medline](#)]
6. **Bhan A**, Browning AC, Shah S, *et al*. Effect of corneal thickness on intraocular pressure measurements with the pneumotonometer, Goldmann applanation tonometer and Tono-pen. *Invest Ophthalmol Vis Sci* 2002;**43**:1389–92. [[Abstract/Free Full Text](#)]
7. **Rootman DS**, *et al*. Accuracy and precision of the Tono-pen in measuring intraocular pressure after keratoplasty and epikeratophakia and in scarred corneas. *Arch Ophthalmol* 1988;**106**:1697–700. [[Abstract](#)]
8. **Quigley HA**, Langham ME. Comparative intraocular pressure measurements with the pneumotonograph and Goldmann tonometer. *Am J Ophthalmol* 1975;**80**:266–73. [[Medline](#)]
9. **Langham ME**, McCarthy E. A rapid pneumatic applanation tonometer. Comparative findings and evaluation. *Arch Ophthalmol* 1968;**79**:389–99. [[CrossRef](#)][[Medline](#)]
10. **Walker RE**, Litovitz TL. An experimental and theoretical study of the pneumatic tonometer. *Exp Eye Res* 1972;**13**:14–23. [[Medline](#)]
11. **Chidlow G**, Nash MS, Crowhurst C, *et al*. The ocular blood flow tonograph: a new instrument for the measurement of intraocular pressure in rabbits. *Exp Eye Res* 1996;**63**:463–9. [[CrossRef](#)][[Medline](#)]

12. **Bafa M** , Lambrinakis I, Dayan M, *et al.* Clinical comparison of the measurement of the IOP with the ocular blood flow tonometer, the Tonopen XL and the Goldmann applanation tonometer. *Acta Ophthalmol Scand* 2001;**79**:15–18.[\[CrossRef\]](#)[\[Medline\]](#)
13. **Yang YC**, Illango B, Cook A, *et al.* Intraocular pressure and pulse rate measurement by the OBF tonograph-comparison to reference instruments. *Ophthal Physiol Opt* 2000;**20**:401–7.[\[Medline\]](#)
14. **Spraul CW**, Lang GE, Ronzani M, *et al.* Reproducibility of measurements with a new slit lamp-mounted ocular blood flow tonograph. *Graefes Arch Clin Exp Ophthalmol* 1998;**236**:274–9.[\[CrossRef\]](#)[\[Medline\]](#)
15. **Bhan A** , Bhargava J, Vernon SA, *et al.* Repeatability of ocular blood flow pneumotometry. *Ophthalmology* 2003;**110**:1551–4.[\[CrossRef\]](#)[\[Medline\]](#)
16. **Whitacre MM**, Stein R. Sources of error with use of Goldmann-type tonometers. *Surv Ophthalmol* 1993;**38**:1–30.[\[Medline\]](#)
17. **Patel S** , McLaughlin JM. Effects of central corneal thickness on measurement of intra-ocular pressure in keratoconus and post keratoplasty. *Ophthalmic Physiol Opt* 1999;**19**:236–41.[\[CrossRef\]](#)[\[Medline\]](#)
18. **Shah S** , Chatterjee A, Mathai M, *et al.* Relationship between corneal thickness and measured intraocular pressure in a general ophthalmology clinic. *Ophthalmology* 1999;**106**:2154–60.[\[CrossRef\]](#)[\[Medline\]](#)
19. **Mackay RS**, Marg E, Oechsli R. Automatic tonometer with exact theory: various biological applications. *Science* 1960;**131**:1668–9.
20. **Kaufmann HE**, Wind CA, Waltman SR. Validity of Mackay-Marg electronic applanation tonometer in patients with scarred irregular corneas. *Am J Ophthalmol* 1970;**69**:1003–7.[\[Medline\]](#)
21. **McMillan F** , Forster RK. Comparison of Mackay-Marg, Goldmann and Perkins tonometers in abnormal corneas. *Arch Ophthalmol* 1975;**93**:420–4.[\[Abstract\]](#)
22. **Azuara-Blanco A** , Bhojani TK, Sarhan AR, *et al.* Tono-pen determination of intraocular pressure in patients with band keratopathy or glued cornea. *Br J Ophthalmol* 1998;**82**:634–6.[\[Abstract/Free Full Text\]](#)
23. **Dohadwala AA**, Munger R, Damji KF. Positive correlation between Tono-pen intraocular pressure and central corneal thickness. *Ophthalmology* 1998;**105**:1849–54.[\[CrossRef\]](#)[\[Medline\]](#)

24. **Geyer O** , Mayron Y, Loewenstein A, *et al.* Tono-pen tonometry in normal and in post-keratoplasty eyes. *Br J Ophthalmol* 1992;**76**:538–40.[\[Abstract\]](#)
25. **Esgin H** , Alimgil ML, Erda S. Clinical comparison of the ocular blood flow tonograph and the Goldmann applanation tonometer. *Eur J Ophthalmol* 1998;**8**:162–6.[\[Medline\]](#)
26. **Tuunanen TH**, Hamalainen P, Mali M, *et al.* Effect of photorefractive keratectomy on the accuracy of pneumatonometer readings in rabbits. *Invest Ophthalmol Vis Sci* 1996;**37**:1810–14.[\[Abstract\]](#)
27. **Abbasoglu OE**, Bowman W, Cavanagh D, *et al.* Reliability of intraocular pressure measurements after myopic excimer photorefractive keratectomy. *Ophthalmology* 1998;**105**:2193–6.[\[CrossRef\]](#)[\[Medline\]](#)
28. **Menage MJ**, Kaufmann PL, Croft MA, *et al.* Intraocular pressure measurement after penetrating keratoplasty: minified Goldmann applanation tonometer, pneumatonometer, and Tono-pen versus manometry. *Br J Ophthalmol* 1994;**78**:671–6.[\[Abstract\]](#)
29. **Kaufmann HE**. Pressure measurement: which tonometer? *Invest Ophthalmol* 1972;**11**:80–5.[\[Medline\]](#)
30. **Glouster J** , Perkins ES. The validity of the Imbert-Fick [law](#) as applied to applanation tonometry. *Exp Eye Res* 1963;**2**:274–83.
31. **Silver DM**, Farrell RA. Validity of pulsatile ocular blood flow measurements. *Surv Ophthalmol* 1994;**38** (suppl) :S72–80.[\[Medline\]](#)
32. **Miglior S** , Albe E, Guareschi M, *et al.* Intraobserver and interobserver reproducibility in the evaluation of ultrasonic pachymetry measurements of central corneal thickness. *Br J Ophthalmol* 2004;**88**:174–7.[\[Abstract/Free Full Text\]](#)
33. **Salz JJ**, Azen SP, Berstein J, *et al.* Evaluation and comparison of sources of variability in the measurement of corneal thickness with ultrasonic and optical pachymeters. *Ophthalmic Surg* 1983;**14**:750–4.[\[Medline\]](#)
34. **Wheeler NC**, Morantes CM, Kristensen RM, *et al.* Reliability coefficients of three corneal pachymeters. *Am J Ophthalmol* 1992;**113**:645–51.[\[Medline\]](#)
35. **Marsich MW**, Bullimore MA. The repeatability of corneal thickness measures. *Cornea* 2000;**19**:792–5.[\[CrossRef\]](#)[\[Medline\]](#)
36. **Thornton SP**. A guide to pachymeters. *Ophthalmic Surg* 1984;**15**:993–5.[\[Medline\]](#)

37. **Wilke K** . Effects of repeated tonometry: genuine and sham measurements. *Acta Ophthalmol (Copenh)* 1972;**50**:574–82.[\[Medline\]](#)
38. **Moses RA**. The Goldmann applanation tonometer. *Am J Ophthalmol* 1958;**46**:865–9.[\[Medline\]](#)

## Lead raises risk for cataracts

Edited by: Dr. Karim Tomey

### *Getting the lead out*

By William J. Cromie  
Harvard News Office

Despite an ongoing national effort to limit exposure to lead, most adults in the United States have accumulated a substantial amount of this noxious metal in their bones. A new Harvard study ties this lurking danger to an increased risk of cataracts, the leading cause of age-related blindness in the world.

The risk is particularly high for older people who breathed lots of lead-polluted air before unleaded gas became widespread. Now, the largest source of lead in this country comes from older houses.

According to the researchers, cataracts account for 40 percent of all blindness worldwide. In the United States, costs of cataract surgery make up the largest single item in the Medicare budget. (Staff illustration by Alec Solomita/Harvard News Office)

"Generalized low-lead exposure, along with pockets of higher exposure, remain commonplace," says Debra Schaumberg, an assistant professor of medicine at the Harvard Medical School. "In the U.S. more than 80 percent of homes built before 1980 are contaminated by lead-based paint and/or leaded water pipes."

Schaumberg, along with colleagues at Brigham and Women's Hospital, the Harvard School of Public Health, and Schepens Eye Research Institute, all in Boston, tracked 795 older men for nine years. They compared lead levels in their shinbones and kneecaps with the results of regular eye examinations. Those with the highest levels of the metal had about three times greater risk of getting cataracts than those with the lowest levels.

"These are the first data collected to suggest that accumulated lead exposure experienced by adults in the U.S. may be an important, unrecognized factor for

cataract," Schaumberg and her colleagues note in the Dec. 9 issue of the Journal of the American Medical Association.

Although the research was conducted with men, the scientists believe that an equal risk exists for women. "We think the same basic biological mechanism is at play, so there's no reason to expect that there would be any difference in the findings for women," Schaumberg notes. "We are planning to study the lead situation in women."

## Selected Major journals Abstracts

### The Effect of Ocular Warming on Ocular Circulation in Healthy Humans

Taiji Nagaoka, MD, PhD; Akitoshi Yoshida, MD, PhD

*Arch Ophthalmol.* 2004; 122:1477-1481.

**Objective** To examine the effect of ocular warming on retinal blood flow (RBF) and subfoveal choroidal blood flow (CBF) in humans.

**Methods** Ocular warming was induced in 10 healthy volunteers using an ocular warming lamp for 10 minutes. The ocular surface temperature was measured before and after warming. The RBF in the retinal artery and vein and the CBF in the foveal region were examined with a retinal laser Doppler velocimetry system and a laser Doppler flowmeter, respectively. Ocular blood flow measurements were performed before and 3, 6, and 9 minutes after warming.

**Results** The ocular surface temperature significantly increased just after warming and returned to baseline 10 minutes later. Three minutes after warming, the mean  $\pm$  SE RBF significantly increased in the retinal artery ( $14.2\% \pm 3.5\%$ ,  $P = .01$ ) and vein ( $15.8\% \pm 3.6\%$ ,  $P = .006$ ). Six minutes after warming, the RBF returned to baseline in the artery and vein. Three and 6 minutes after warming, the mean  $\pm$  SE CBF significantly decreased  $16.6\% \pm 4.2\%$  and  $24.2\% \pm 4.7\%$ , respectively ( $P = .001$  for both). Nine minutes after warming, the measurements returned to baseline.

**Conclusions** The RBF increased and the CBF decreased in the foveal region after cessation of ocular warming in healthy young volunteers.

The CBF in the foveal region may contribute to maintaining a constant retinal temperature in response to ocular warming.

## Increased Intraocular Pressure and Corneal Endothelial Cell Loss Following Phacoemulsification Surgery

*Ophthalmic Surgery, Lasers and Imaging Vol. 35 No. 6 November/December 2004*

Ryuzi Yachimori, MD; Toshie Matsuura, MD; Ken Hayashi, MD; Hideyuki Hayashi, MD

### BACKGROUND AND OBJECTIVE

To compare the influence of low-molecular-weight viscoelastics on postoperative intraocular pressure (IOP) and corneal endothelial cell loss after phacoemulsification surgery. **PATIENTS AND METHODS** Sixty-nine eyes undergoing phacoemulsification surgery were randomized to have either Opegan (Santen Pharmaceuticals, Osaka, Japan) alone or the soft-shell technique using Viscoat (Alcon Surgical, Fort Worth, TX) during phacoemulsification. The IOP was measured preoperatively and at 5 and 24 hours postoperatively. Intraoperative factors and corneal endothelial cell loss were also examined.

**RESULTS** Mean IOP was increased at 5 hours after surgery but returned to preoperative levels at 24 hours in the Opegan group, whereas it remained higher at 24 hours than at preoperative levels in the soft-shell group. When comparing groups, IOP at 5 and 24 hours postoperatively in the Opegan group was significantly less than that in the soft-shell group. Corneal endothelial cell loss was approximately the same in the two groups.

**CONCLUSIONS** The increase in IOP following phacoemulsification surgery with the use of Opegan was less than that with the soft-shell technique using Viscoat, although endothelial injury was almost the same.

[*Ophthalmic Surg Lasers Imaging* 2004;35:453-459.]

## Small-Incision Manual Extracapsular Cataract Extraction Using Deep-Topical, Nerve-Block Anesthesia

*Ophthalmic Surgery, Lasers and Imaging Vol. 35 No. 6 November/December 2004*

Berkant Kaderli, MD; Remzi Avci, MD

### BACKGROUND AND OBJECTIVE

To determine whether deep-topical anesthesia is suitable for small-incision manual extracapsular cataract extraction (ECCE).

## **PATIENTS AND METHODS**

Three hundred twenty-six eyes of 253 patients had small-incision manual ECCE under topical anesthesia with a 4% lidocaine-soaked sponge. The severity of the pain, eye movements, blepharospasm, and intraoperative complications were recorded. Patient and surgeon satisfaction levels were assessed.

## **RESULTS**

Operations on 323 eyes (99%) were completed with topical anesthesia. Intraoperatively, topical anesthesia was converted to peribulbar anesthesia in 3 eyes (0.9%) because of excessive eye movements. The cauterization of the scleral vessels and conjunctiva and the subconjunctival injection were the stages causing severe pain. The most frequent intraoperative complication was posterior capsule rupture in 6 eyes (1.8%). The satisfaction level was 95% for the patients and 90% for the surgeon.

## **CONCLUSION**

Deep-topical, nerve-block anesthesia provides anesthesia with sufficient quality for small-incision manual ECCE.

[*Ophthalmic Surg Lasers Imaging* 2004;35:460-464.]

## **Cyclosporin-Augmented Laser Peripheral Iridoplasty**

***Ophthalmic Surgery, Lasers and Imaging Vol. 35 No. 6 November/December 2004***

Earl R. Crouch, Jr., MD; Frank A. Lattanzio, Jr., PhD; Patricia B. Williams, PhD; Peter V. Mitrev, MD; Todd Theobald, MD; Robert C. Allen, MD

## BACKGROUND AND OBJECTIVE

Almost all patients develop iritis following argon [laser](#) peripheral iridoplasty. Numerous adverse effects, particularly elevated intraocular pressure (IOP) and reduced microbial resistance, complicate therapy with topical corticosteroids. An immunomodulator, such as cyclosporin A (CsA), avoids these undesirable effects, yet may suppress ocular inflammation.

## MATERIALS AND METHODS

Argon [laser](#) peripheral iridoplasty was performed on anesthetized rabbits with pigmented iris epithelium. Rabbits were randomly assigned to the untreated control, CsA (2%), or dexamethasone (0.1%) groups. Postoperative inflammation was documented by digital [photography](#), IOP, and protein in aqueous humor.

## RESULTS

Iris injection, aqueous flare, and fibrin decreased most rapidly in the control group, as did protein in aqueous humor. Decreases in IOP of 49% to 58% were similar in all three groups. There were no differences in conjunctival congestion between the groups.

## CONCLUSION

Neither treatment with anti-inflammatory [drugs](#) that inhibit phagocytosis (eg, topical steroids) nor treatment with anti-inflammatory [drugs](#) that suppress T-lymphocytes (eg, topical CsA) significantly attenuated inflammation following iridoplasty.

[*Ophthalmic Surg Lasers Imaging* 2004;35:475-481.]

## Effect of nimodipine on ocular blood flow and colour contrast sensitivity in patients with normal tension glaucoma

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## ABSTRACT

**Aim:** To investigate the effects of oral nimodipine on ocular haemodynamic parameters and colour contrast sensitivity in patients with normal tension glaucoma (NTG).

**Design:** The study was performed in a randomized, placebo controlled, double masked, crossover [design](#).

**Participants:** Nimodipine (60 mg) or placebo was administered to 14 consecutive NTG patients.

**Methods:** The effects of oral nimodipine or placebo on ocular and systemic haemodynamic parameters and colour contrast sensitivity along the tritan axis were studied two hours after administration. Optic nerve head blood flow (ONHBF) and choroidal blood flow (CHBF) were assessed with [laser](#) Doppler flowmetry. Ocular fundus pulsation amplitude (FPA) was measured with [laser](#) interferometry. Colour contrast sensitivity (CCS) was determined along the tritan colour axis.

**Main outcome measures:** ONHBF, CHBF, FPA, intraocular pressure and CCS were assessed in patients with NTG.

**Results:** Mean ocular FPA increased by 14% (SD 14%) ( $p = 0.0008$ ), ONHBF by 18% (SD 16%) ( $p = 0.0031$ ), and CHBF by 12% (SD 14%) ( $p < 0.001$ ) after administration of nimodipine. Nimodipine also decreased the threshold of colour contrast sensitivity along the tritan colour axis (–14% (SD 12%);  $p = 0.048$ ). However, individual changes in FPA, ONHBF, or CHBF were not correlated with changes in threshold of CCS along the tritan colour axis.

**Conclusions:** The results indicate that nimodipine increases ONH and choroidal blood flow in NTG patients and improves CCS. The latter effect does not, however, seem to be a direct consequence of the blood flow improvement.

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## Impact factors on intraocular pressure measurements in healthy subjects

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### ABSTRACT

**Aim:** To evaluate whether intraocular pressure (IOP) calculation by applanation tonometry is determined more essentially by the subject's neck position or by neck constriction.

**Methods:** 23 right eyes of 23 healthy subjects (12 male, 11 female) were included. IOP was measured by applanation tonometry with the TonoPen on sitting participants under four different conditions: with open collar upright (A) or with the head in the headrest of a slit lamp (B), with a tight necktie upright (C) or in slit lamp position (D). All measurements with neck constriction were performed 3 minutes after placing the necktie.

**Results:** Mean IOP was 16.9 (SD 2.3) mm Hg (range 11–21 mm Hg) (A), 18.1 (SD 2.2) mm Hg (range 14–22 mm Hg) (B), 17.9 (SD 2.9) mm Hg (range 12–25 mm Hg) (C) and 18.7 (SD 2.7) mm Hg (range 13–24 mm Hg) (D). Mean IOP increased by 1.3 (SD 2.6) mm Hg ( $p = 0.028$ , paired  $t$  test, range +0.2 to +2.4 mm Hg) if subjects changed position from A to B. There was no statistically significant difference between measurements with or without neck constriction.

**Conclusion:** Applanation tonometry may be inaccurate if performed in slit lamp position. In contrast, tight neckties do not significantly affect IOP evaluation in healthy subjects.

## Acute orbital effects of retrobulbar injection on optic nerve head topography

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**Aim:** To assess the effects of acute orbital volume changes after retrobulbar injection on optic nerve head topography.

**Methods:** The study population consisted of 95 patients with type 2 [diabetes](#) mellitus with clinically significant macular edema who required focal pattern [laser](#) photocoagulation therapy in one eye. Before each [laser](#) treatment, 49 patients required a retrobulbar injection (approximately 7 ml of a mix of lidocaine 2% with epinephrine and bupivacaine 0.75% in equal volumes) to provide ocular akinesia. Both eyes of all patients underwent optic nerve head topographic analysis once before [laser](#) treatment (within 30 minutes), and repeated within 1 hour, 1 day, 1 week, 2 weeks, and 4 weeks after treatment, respectively. Topographic analyses were performed using a confocal scanning [laser](#) ophthalmoscope, HRT-II. The disc area, topography standard deviation, and a total of 12 topographic parameters were calculated by HRT-II.

**Results:** The mean age of the patients was 37.9 (SD 3.2) years. The mean disc area of the subjects was 2.12 (0.44) mm<sup>2</sup>. Fellow eyes which were not treated with [laser](#), and those treated eyes which did not receive retrobulbar injection before therapy were found not to reveal significant changes in disc topography in any of the examinations (all p values >0.05). In the topographic examinations in the first hour, first day, and first week, [laser](#) treated eyes which underwent retrobulbar injection demonstrated significant increase in the disc area, rim area, rim volume, rim area/disc area, and cup shape measure parameters while optic cup parameters significantly decreased (all p values <0.05). In the second week examinations, they did not show significant difference in disc area measurements (p>0.05). By the fourth week, all of the optic nerve head topographic variables were not significantly different from the pre-injection values (all p values >0.05). Colour stereoscopic photographs did not reveal any differences in optic disc appearance.

**Conclusion:** Acute orbital volume change following retrobulbar injection may cause significant topographic evidence of optic disc edema lasting approximately 1 week. Significant changes in optic rim and cup area may last for 2 weeks after injection, with all topographic changes returning to baseline by 1 month after injection. The present findings could be a model to reflect the pathological processes that occur in cases of acute orbital volume changes such as retrobulbar haemorrhage.

## **Persistency and treatment failure in newly diagnosed open angle glaucoma patients in the United Kingdom**

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## **ABSTRACT**

**Aim:** To determine utilization patterns and calculate treatment failure and discontinuation rates in patients with open angle glaucoma treated in the United Kingdom with any of six groups of intraocular pressure (IOP) lowering agents.

**Methods:** The UK General Practice Research Database was used to identify newly diagnosed (after 1 January 1997) open angle glaucoma patients who were naive to therapy with any of six index drug groups: carbonic anhydrase inhibitors, latanoprost, miotics, sympathomimetics, timolol, and other (non-timolol)  $\beta$  blockers. Analyses included drug treatment data for 1 year following diagnosis. Outcomes were (1) [time](#) to therapy failure, defined as either change in index drug (replacement or addition of therapy) or patient referral for surgery, and (2) [time](#) to therapy discontinuation, defined as either therapy failure or no refill of the index drug in a period twice that covered by the first prescription fill. Cox proportional hazard regression and Kaplan-Meier and life table methods were used to compare groups.

**Results:** Among the 2001 eligible patients, a  $\beta$  blocker other than timolol was the most widely prescribed (42%), followed by timolol (32%), carbonic anhydrase inhibitors (10%), and latanoprost (7%). Compared to latanoprost, those treated with any alternative agent were significantly more likely to fail ( $p \leq 0.005$  for each comparison) and to discontinue ( $p \leq 0.05$  for each comparison) therapy. Failure rates ranged from 13% (latanoprost) to 45% (sympathomimetics), and discontinuation rates ranged from 30% (latanoprost) to 63% (miotics).

**Conclusion:** Latanoprost treated patients demonstrated lower rates of therapy failure and therapy discontinuation compared with patients treated with other widely used IOP lowering medications, including  $\beta$  blockers.

# Medicine In our Life

**Study: 'Puttering' calories count**

The calories [people](#) burn in everyday activities, such as standing, pacing and cleaning, are a much more important factor in obesity than scientists had realized. But some [people](#) do not seem That is the conclusion of a study in today's issue of [Science](#) that finds overweight "couch potatoes" sit about 2½ hours more a day than normal-weight couch potatoes.

The heavier [people](#) studied were not sitting more just because of their weight, the study says. "Their movements were fixed, like it was biologically driven," says endocrinologist James Levine of the Mayo Clinic in Rochester, Minn. "Many of us are programmed not to move much. When you offer some [people](#) a comfy chair, they'll take it."

Mayo Clinic researchers recruited 20 sedentary people: 10 obese and 10 normal weight. They wore movement monitors for 10 days.

- The obese [people](#) sat for an average of 164 minutes more a day.
- The leaner [people](#) moved around doing basic activities, such as puttering about the [house](#), for 152 more minutes a day. They used about 350 more calories a day.

"This is not a 'fidget more' story. It's a 'get off your bottom' story," says Levine. What makes a difference is getting up and [moving](#), not just tapping your toes, he says.

Researchers first speculated that if the heavy [people](#) lost weight, they might move more, and if the lean ones gained weight, they might be more sedentary.

Then researchers adjusted calorie intake to cause weight changes. The obese lost an average of 15 pounds; the lean [people](#) gained 10. But both groups did the same amount of sitting or [moving](#).

There may be "a brain-chemical difference between [people](#) because of their genes," Levine says. A genetic trait may be to blame, agrees Eric Ravussin of the Pennington Biomedical Research Center in Baton Rouge. "Just telling [people](#) to sit less is going to lead to nowhere," he says. "We have to redesign our environment so it's not as conducive to sitting."

