CJO-RCO

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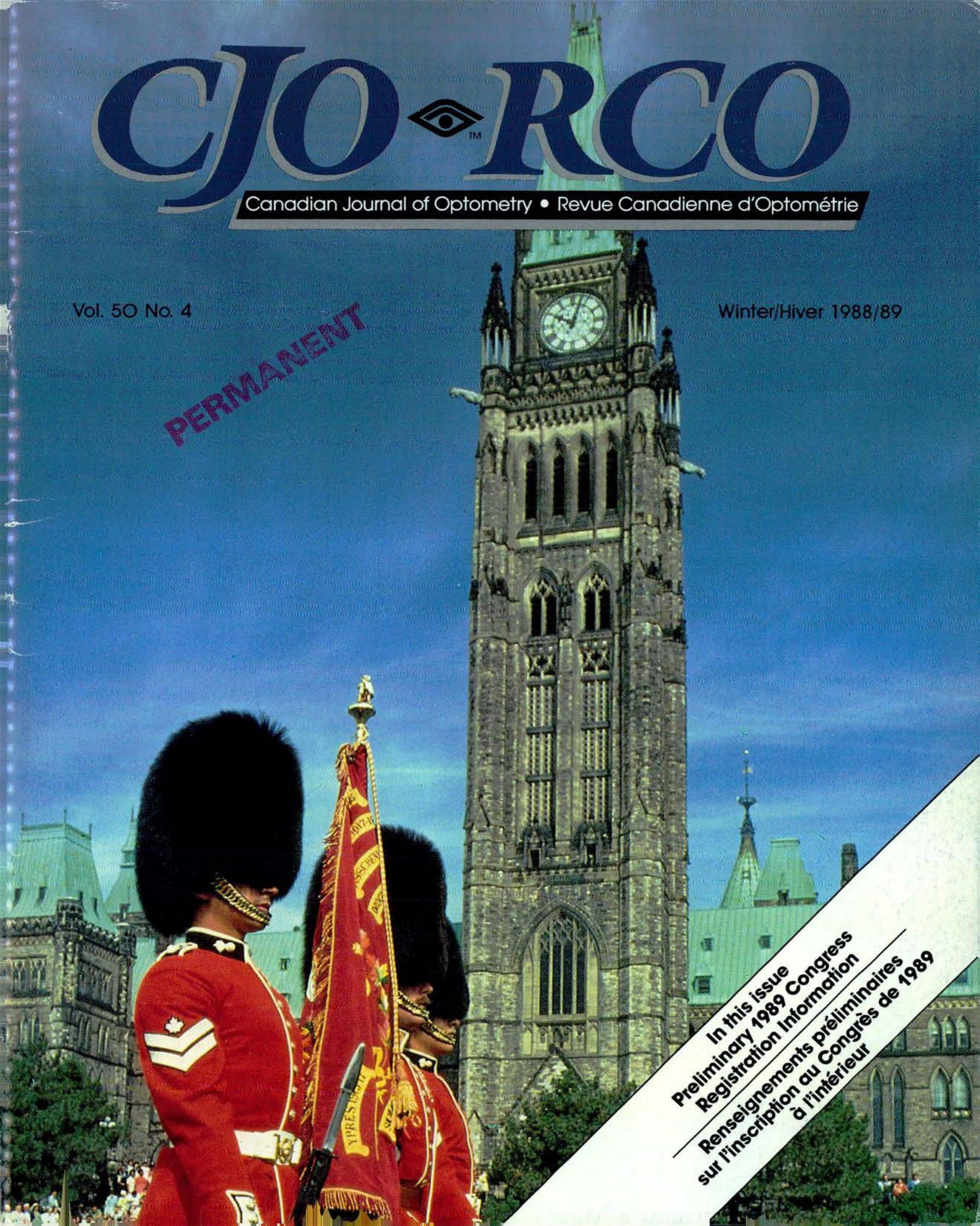

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Renseignements préliminaires sur l'inscription au Congrès de 1989 à l'intérieur

Look Beyond The Surface

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L'ASSOCIATION CANADIENNE DES OPTOMÉTRISTES

Dear Friends and Colleagues,

It is already time to start planning your summer, believe it or not, and the first week of August should be reserved on your calendars for our 1989 Biennial Congress.

For **Rendez-vous Ottawa '89**, we intend to welcome you to the very heart of the national capital region. We have no doubt you will remember the scenery and the vitality of a city whose year round policy is to welcome its visitors warmly.

We offer you an exceptional Education program being put together under the guidance of Dr. Maurice Bélanger, long familiar to Canadian Optometry as the Senior Editor of the *CJO*RCO*. Class reunions are already being planned for graduates of both Canadian Schools of Optometry.

Your Spouse or Guest, meanwhile, will be cruising the Thousand Islands, touring Ottawa and environs' many attractions, including some of Canada's finest museums and galleries. Your children? They'll be spelunking, among other things. We also plan to introduce them to dinosaurs and enough partying and picnicking that **Rendez-vous Ottawa '89** will long be counted among their special memories.

As a family, you will also enjoy a very special Opening Ceremonies, an outdoor fun night known simply as the "Bytown Bash", a free afternoon to visit, perhaps, the ByWard Market (a five-minute walk from the Hotel), or maybe the Parliament Buildings, just five minutes in the opposite direction. Or if you don't feel like walking, you can lounge canalside and watch Colonel John By's 150-year old locking system channel boats from the Rideau Canal to the Ottawa River.

There is so much to see and do; our Local Arrangements Committee is ready and waiting. **Rendez-vous Ottawa '89** is a CAO Congress you will not want to miss!

Sincerely

Pierre LeVasseur,
OD
Local
Arrangements
Chairman

Chers amis et collègues,

Croyez-le ou non, il est déjà temps de commencer à faire vos projets d'été et, à cet égard, je vous invite à réserver tout de suite la première semaine d'août pour notre Congrès biennal de 1989.

Pour **Rendez-vous Ottawa 89**, nous comptons vous accueillir au coeur même de la région de la Capitale nationale. Vous vous rappellerez sans doute le décor et la vitalité d'une ville qui sait toujours accueillir chaleureusement ses visiteurs, quelle que soit la période de l'année.

Nous vous offrons un exceptionnel programme d'éducation, préparé sous la direction du Dr Maurice Bélanger, bien connu des optométristes canadiens pour avoir été le rédacteur en chef de la *RCO*CJO*. On prépare déjà des conventums pour les diplômés des deux écoles canadiennes d'optométrie.

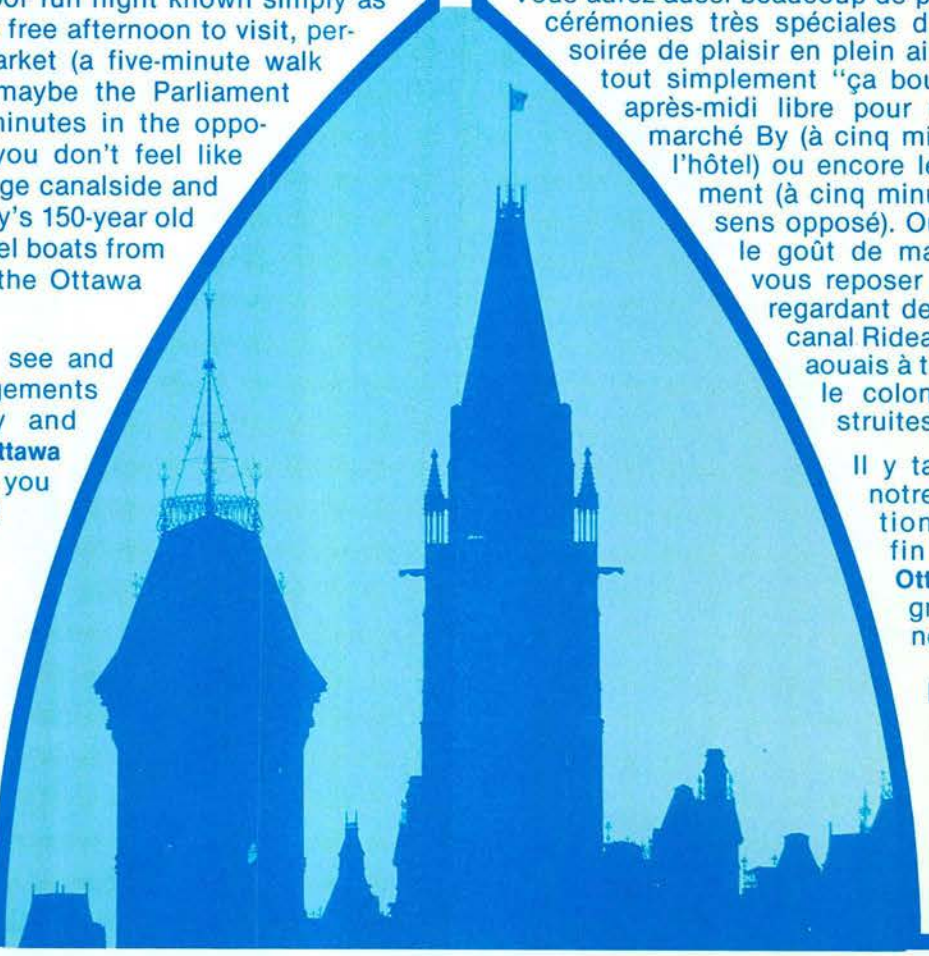
Votre conjoint ou invité, entre-temps, fera la croisière des Mille-Îles, visitera les nombreuses attractions d'Ottawa et des environs, y compris certains des meilleurs musées et galeries d'Ottawa. Vos enfants? Ils feront de l'exploration de grottes, entre autres choses. Nous avons aussi l'intention de les présenter aux dinosaures, et de leur organiser assez de fêtes et de pique-niques pour qu'ils gardent longtemps le souvenir de **Rendez-vous Ottawa 89.**

Vous aurez aussi beaucoup de plaisir, en famille, aux cérémonies très spéciales d'inauguration, à une soirée de plaisir en plein air que nous appelons tout simplement "ça boum à Bytown", à un après-midi libre pour visiter, peut-être, le marché By (à cinq minutes de marche de l'hôtel) ou encore les édifices du Parlement (à cinq minutes à peine dans le sens opposé). Ou, si vous n'avez pas le goût de marcher, vous pourrez vous reposer le long du canal en regardant des bateaux passer du canal Rideau à la rivière des Outaouais à travers le écluses que le colonel John By a construites il y a 150 ans.

Il y tant à voir et à faire; notre Comité d'organisation locale est tout fin prêt. **Rendez-vous Ottawa 89** est un congrès de l'ACO que vous ne voudrez pas rater!

Le président de l'organisation locale,

Pierre
LeVasseur,
OD



"Rendez-vous Ottawa '89" Program Highlights

1. **Education**
   - **Dr. John Griffin (Southern California College of Optometry)** on Binocular Vision
   - **Dr. Alfred Rosenbloom (School of Optometry, University of Chicago)** on Geriatric Vision
   - **Mr. Arthur Drache (Ottawa)** on Taxation and the Professional
   - **plus . . .**
     Vision Fields
     Cosmetic Surgery
     The Retina
     Practice Management
   - **Huge Exhibit Hall**
   - **Canadian Optometric Education Trust Fund** Raffle and Draw

2. **Spouses**
   - A "Capital" tour
   - Day Cruise among the famed Thousand Islands
   - Canada's new National Gallery and even newer National Museum of Civilization

3. **Junior Delegates**
   - The National Experimental Farm, the National Museum of Science and Technology
   - The Bonnechere Caves, The Pinto Valley Ranch
   - Canada's brand new National Museum of Civilization

4. **And of course . . .**
   - A Spectacular Opening Ceremony
   - The renowned Bytown Bash on Victoria Island
   - Class Reunions
   - The Gala President's Banquet, Ball and CAO Awards Presentation

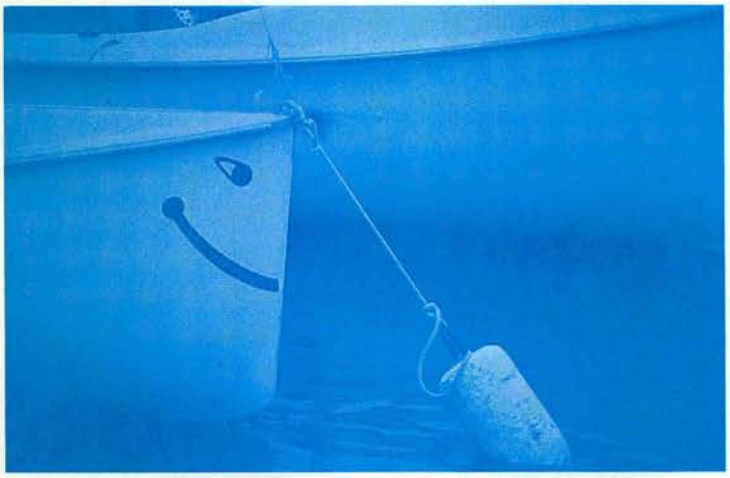
Rendez-vous Ottawa 89 Principales activités au programme

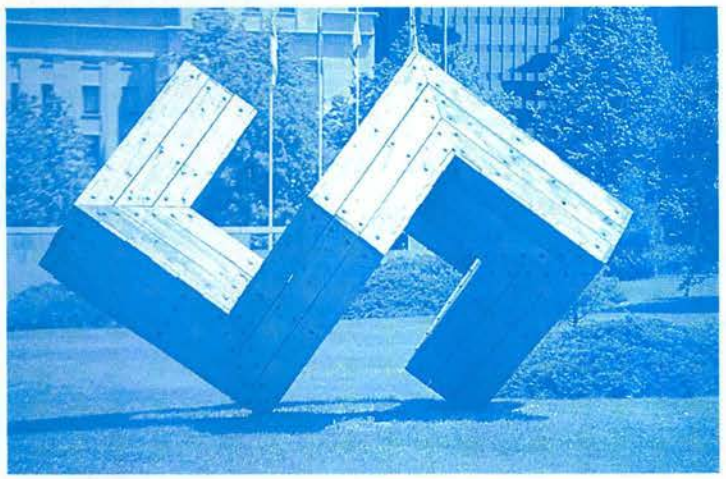
1. **Education**
   - **Dr John Griffin (Collège d'optométrie du Sud de la Californie)** Vision binoculaire
   - **Dr Alfred Rosenbloom (École d'optométrie de l'Université de Chicago)** Vision gériatrique
   - **M. Arthur Drache (Ottawa)** L'impôt et le spécialiste
   - **et . . .**
     Champs de vision
     Chirurgie esthétique
     La rétine
     La gestion de la pratique
   - **Immense salle d'exposition**
   - **Fonds de fiducie des optométristes canadiens pour l'éducation** Loterie et tirage

2. **Conjoints**
   - Magnifique visite de la Capitale
   - Journée de croisière aux Mille-Îles
   - Visite du nouveau Musée des beaux-arts et du Musée canadien des civilisations, plus nouveau encore

3. **Jeunes délégués**
   - Visite de la Ferme expérimentale nationale et du Musée national des sciences et de la technologie
   - Visite des cavernes Bonnechere et du Ranch Pinto Valley
   - Visite du tout nouveau Musée national des civilisations

4. **Et bien sûr . . .**
   - Cérémonie d'ouverture spectaculaire
   - Ça boume à Bytown, à l'Île Victoria
   - Réunions des anciens
   - Banquet de gala et bal du Président, avec remise des Prix de l'ACO





"Ready, Aim, Shoot!"

for a prize in the **Rendez-vous Ottawa '89 Party-of-Your-Choice Photography Contest**

Our biennial Photo Contest will again be open to everyone registered at the Congress and will feature outstanding prizes for the best prints submitted in the following "Party" categories:

1. **PC** (People of Canada): candid photos of family, friends or total strangers!
2. **LIB** (Life In Bloom): scenic photos of Canada's natural panoramas: wild woods or your backyard garden, wildlife or your family kitten.
3. **NDP** (Novel, Dramatic Pictures): Abstracts, multiple exposures, time-lapse. Show us your favorite camera and darkroom tricks.

Watch for complete details in the next *CJO*RCO*, but start shooting now!

Prêts, visez, clic!

pour gagner un prix au **Concours de photographie du Parti de votre choix de Rendez-vous Ottawa 89.**

Toutes les personnes inscrites au Congrès peuvent participer à notre Concours de photographie biennal, où nous offrirons de superbes prix pour les meilleures photos des catégories de "Partis" suivants :

1. **PC** (Personnages Canadiens) : instantanés de vos parents, de vos amis, voire de parfaits inconnus;
2. **LIB** (Lieux Illuminés en Beauté) : photos de paysages naturels du Canada, de la forêt au jardin, des animaux sauvages aux chatons.
3. **NPD** (Nouvelle Photo Diverse) : abstractions, expositions multiples, expositions prolongées, montrez-nous vos trucs.

Pour plus de détails, lisez le prochain numéro de la *RCO*CJO*, mais commencez sans tarder à prendre vos photos!

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Distinguished Visiting Surgeon Lecture: **Richard Lindstrom**, M.D.

INTERNATIONAL

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Oliver Dabezies, M.D., Louisianna
Alejandro Dalma, M.D., Mexico
Peter Donshik, M.D., Connecticut
Daniel Epstein, M.D., Sweden
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Zoraida Fiol-Silva, M.D., Pennsylvania
Mel Freeman, M.D. Washington
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Jack Hartstein, M.D., Missouri
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Perry Rosenthal, M.D., Massachusetts
Sanford Severin, M.D., California
Jerry Shields, M.D., Pennsylvania
Mark Speaker, M.D., New York
Tom Spring, M.D., Australia
Spencer Thornton, M.D., Tennessee
Frank Weinstock, M.D., Ohio

CANADIAN

Don Boyaner, M.D., Montreal
Murchison Callender, O.D., Waterloo
Jean Pierre Chartrand, M.D., Montreal
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John Morgan, M.D., Kingston
Roderick Morgan, M.D., Edmonton
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John Valberg, M.D., Ottawa
Bernard Slatt, M.D., Toronto
Leon Solomon, M.D., Montreal
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Raymond Stein, M.D., Toronto

TOPICS COVERED

An international anterior segment conference emphasizing contact lenses, cataract and refractive surgery.

- Contact Lens and Corneal Disorders
- Environmental Effects on the Eye
- Gas Permeable Contact Lens in Canada
- Solving Contact Lens Problems
- Managing the Dry Eye
- Corneal Symposium
- The Red Eye
- Management of Astigmatism
- Problems with Intraocular Lenses
- Advances in Refractive Surgery
- Contact Lens Care System Update

ADDED FEATURES

Workshops, panel discussions, and product exhibitions. Exciting social functions, as well as Toronto's many tourist attractions.

- Hands-On Contact Lens Workshop
- Hands-On R.G.P. Contact Lens Modification
- Welcome Reception Thursday
- Gala Cocktail Reception Friday
- Phakoemulsification Wet Lab for M.D.'s
- Exhibition of Latest Contact Lens and Medical/Surgical Ophthalmic Products
- Scientific Workshops
- Breakfasts & Lunches Included

REGISTRATION

☐ Early Registration	$225
After April 10	$275
☐ Residents (with letter of verification)	$50
☐ Ophthalmic Medical Technicians, Nurses, and Opticians	$125
After April 10	$150
☐ Basics of Contact Lenses Thursday, May 25 (Pre-registration)	$60
☐ Hands-on Contact Lens Workshop Sunday May 28 (Limited Registration)	$60

Make reservations directly with hotel at convention rates: **Harbour Castle Westin Hotel,** One Harbour Square, Toronto, Canada M5J 1A6 (416) 869-1600

Please enclose cheque payable to: **OPHTHALMIC EDUCATIONAL SEMINARS** and send to: Harold Stein, M.D. FRCS(C). 40 Prince Arthur Ave., Toronto, Canada M5R 1A9. For information call Ms. Jill Klintworth at (416) 966-3336

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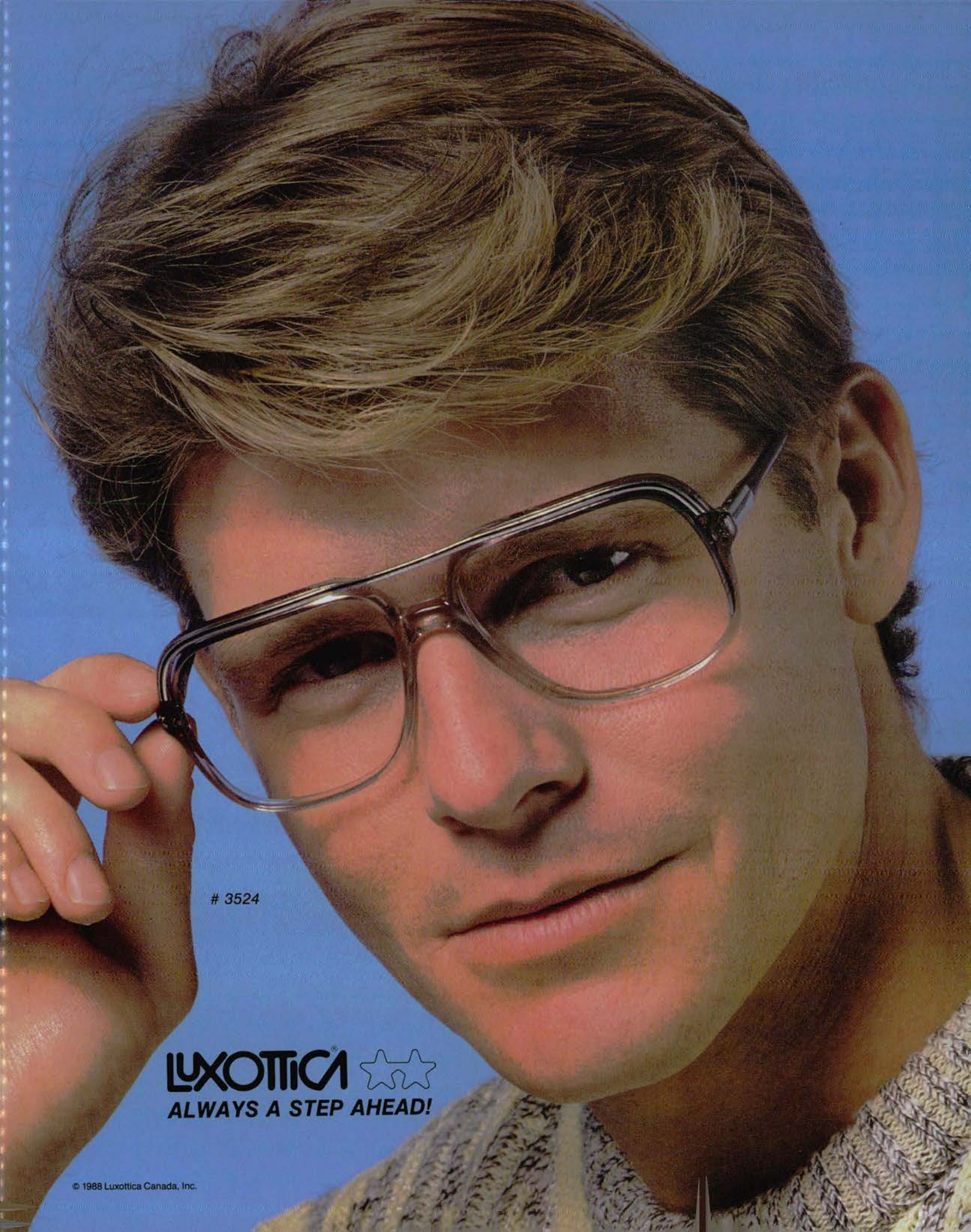
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The Canadian Journal of Optometry is the official publication of the Canadian Association of Optometrists

La Revue canadienne d'optométrie est l'organe officiel de l'Association canadienne des optométristes

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The Changing of the Guard

•

La relève de la garde
La colline du parlement on été/Ottawa

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EDITORIAL/ÉDITORIAL

Honesty in Marketing

In recent months, this writer's office has been bombarded with promotional literature from firms in the ophthalmic community offering gifts and prizes for the purchase of specific items, whether they be spectacle frames/lenses, contact lenses or contact lens solutions.

We are not here alluding to the usual volume discounts on orders, but rather to prizes and gifts offered in exchange for what actually amount to relatively small purchases.

Intrigued by one of these promotions, we succumbed and placed a small order, instructing the supplier to send the merchandise, but not the gift. We were interested in the quality of the merchandise purchased and we can honestly say that the frames in question, as received, were good quality and offered a satisfactory range of size and colour.

Step 1 completed, we called the supplier and asked what we would be charged if we accepted the merchandise and refused the gift. We expected a reduction — but not one of 20 percent! Comparing the reduced charges to other frames of similar quality in our stock, we found no real difference.

So what conclusions can be draw from this simple experiment, particularly in our present age of consumerism and increasing health care costs?

It is a fact of life that advertising and other promotional expenses raise the cost of marketable items and services to the consumer. But these additional expenses usually do not rebound as gifts and other prizes on the retailer. The retailer, in fact, does not benefit in any way except in the form, perhaps, of increased sales.

But even this benefit is not applicable in the case of ophthalmic suppliers who offer gifts to the optical practitioner, gifts which are actually paid by the patient purchasing these frames or lenses.

And our question is: is such a practice ethical, or does it not contribute to the increase in costs to the patient, an increase without justifiable cause? Is the patient, in fact, actually paying for a service (s)he is not receiving?

We would suggest that practitioners engaging in such activities may well be placing themselves in double jeopardy: civil action and a judgement by their peers of professional misconduct.

However, firms abetting such activities are equally guilty as accomplices and should be instructed to cease and desist. A refusal to comply should then bring about a concerted action, even in the form, perhaps, of a national boycott supported by all Associations.

GMB

PRESIDENT'S PODIUM/MOT DU PRÉSIDENT

SYVW RIP or OMT?*

*Retire It Permanently or One More Time?

Save Your Vision Week in Canada 1989 (SYVW) is upon us once again and it seems as appropriate a time as any to raise a few reasonable questions about the event.

Since 1985, when CAO first began to revive the annual celebration as a more prominent national program, by including the participation of an Honorary Chairman and the annual endorsement of the Prime Minister of Canada, SYVW has attracted the likes of such prominent Canadians as Linda Thom, Captain Marc Garneau, Robert Bateman, Wayne Gretzky and Lynn Johnston in support of our annual theme, "Life Is Worth Seeing!"

In their turn, the provincial Associations of Optometrists all across Canada have achieved vastly successful programs of publicity and public relations based on various local adaptations and extensions of the message as it related to each successive Honorary Chairman.

But have we now, perhaps, with **Save Your Vision Week** and "Life is Worth Seeing!" shot our bolt?

Let's examine briefly just what it is that we are seen to be promoting. Looking for the moment just at **Save Your Vision Week** as a generic title of the campaign, we are literally alerting Canadians to activities and practices that pose threats to good vision and eyesight (and, of course, ways and means of protecting against these threats). But where, for example, can we legitimately promote optometric Low Vision services, orthoptic training programs, colour vision testing and the profession's role in diagnosis and detection of eye disease under a title like **Save Your Vision Week?** The title, to me, sounds somewhat hollow when presented to a patient with a congenital condition.

Save Your Vision, protect your vision, guard this most precious sense. But is this all that we, as optometrists, have to offer Canadians — a warning? (Interestingly enough, those readers who are bilingual will have realized that it is only in English Canada that this is the message we are sending. Several years ago, when CAO received recommended translations for **Save Your Vision Week** and "Life Is Worth Seeing!", CAO was given **La semaine de la vision** and "La vie, faut voir ça", which in turn translate *literally* as **Vision Week** and "Life: You Have to See It!" French Canadians, in other words, are not being told to "save" their vision.)

So, if not **Save Your Vision Week in Canada,** then what? For the sake of public service messages, we would, for example, be seen unfortunately only as self-serving under a banner like **National Optometry Week.** What about a title that is some variation on **Better Vision Week,** under which we could more legitimately promote the optometrist's role in diagnosing and treating low vision conditions, for example, or other vision and eye care aspects that go beyond safety?

What do *you* think? Does **Save Your Vision Week** need saving?

Would a new title freshen a well-worn campaign? Does the campaign need to be freshened? Please drop a line directly to your CAO Councillor, or to me in care of CAO, if you have some thoughts

(continued on page 269)

La Semaine de la vision, à prendre ou à laisser?

La Semaine de la vision au Canada, édition 1989, est encore une fois à nos portes, et le moment semble aussi bien choisi que n'importe quel autre de soulever quelques questions raisonnables au sujet de cette campagne.

Depuis 1985, année où l'ACO a entrepris pour la première fois de faire de cette célébration annuelle un programme national plus en vue en obtenant la participation d'un président honoraire et l'appui annuel du premier ministre du Canada, des personnalités canadiennes comme Linda Thom, le capitaine Marc Garneau, Robert Bateman, Wayne Gretzky et Lynn Johnston ont prêté leur appui à la Semaine de la vision et à son thème annuel, «La vie, faut voir ça!»

De leur côté, les associations provinciales des optométristes d'un bout à l'autre du Canada ont organisé des programmes fort efficaces de publicité et de relations publiques basés sur diverses adaptations locales et extensions du message en fonction de chaque président honoraire.

Mais n'avons-nous peut-être pas joué notre dernière carte avec la Semaine de la vision et «La vie, faut voir ça!»?

Examinons brièvement ce que nous sommes exactement en train de promouvoir auprès de la population. Si nous nous attardons simplement au titre anglais de la campagne, **Save Your Vision Week,** nous alertons littéralement les Canadiens aux activités et aux pratiques qui présentent des risques pour la vue et une bonne vision (et, bien entendu, aux façons de se protéger contre ces risques). Cependant, comment pouvons-nous, par exemple, promouvoir en toute légitimité des services optométriques de basse vision, des programmes de formation en orthoptique, des tests de vision des couleurs et le rôle que joue l'optométriste dans le diagnostic et la détection des maladies des yeux avec un titre comme **Save Your Vision Week**? À mon avis, ce titre semble un peu vain si on l'applique à un patient souffrant d'une maladie congénitale.

«Save Your Vision» signifie protégez votre vue, préservez ce sens extrêmement précieux. Mais est-ce tout ce que nous, les optométristes, avons à offrir aux Canadiens — un simple avertissement? (Fait intéressant qu'auront constaté nos lecteurs bilingues, ce message particulier n'est diffusé qu'au Canada anglais. Il y a plusieurs années, lorsque l'ACO a fait traduire Save Your Vision Week et «Life Is Worth Seeing!», on lui a recommandé **La Semaine de la vision** et «La vie, faut voir ça!». Autrement dit, on n'invite pas les Canadiens français à «protéger» leur vue.)

Alors, si on laisse tomber le titre anglais **Save Your Vision Week in Canada**, par quoi allons-nous le remplacer? Pour les messages d'intérêt public, un titre comme **National Optometry Week** (Semaine nationale des optométristes) semblerait beaucoup trop intéressé de notre part. Mais que penser d'un titre semblable à **Better Vision Week** (Semaine de promotion d'une meilleure vision), qui nous permettrait de promouvoir de façon plus légitime le rôle que joue l'optométriste dans le diagnostic et le traitement des conditions de basse vision, par exemple, ou d'autres aspects de la vision

(suite à la page 269)

Integrating Optometric Eye Care into National Health Insurance: The Economic Issues

M.C. Brown *

Editor's Note

The following paper, "Integrating Optometric Eye Care into National Health Insurance: The Economic Issues", by Professor Malcolm C. Brown of the University of Calgary, was commissoned by the Alberta Association of Optometrists. It is published here because the Editors of the CJO*RCO *and the Council of the Canadian Association of Optometrists feel that many of the points raised by the author may be of interest to a wider audience than just those individuals living within the province of Alberta.*

It must be noted, however, that any opinions expressed in this paper are solely those of the author and are in no way to be taken as either opinion or policy of the Canadian Association of Optometrists.

Note du rédacteur

Le document qui suit, intitulé "Integrating Optometric Eye Care into National Health Insurance: The Economic Issues", du professeur Malcolm C. Brown de l'Université de Calgary, a été préparé à la demande de l'Association des optométristes de l'Alberta. Nous le publions ici parce que l'équipe de rédaction de la Revue et le conseil de l'Association canadienne des optométristes estiment que nombre des points soulevés par l'auteur pourraient intéresser un plus vaste public que simplement les gens de l'Alberta.

Cependant, il faut signaler que les opinions exprimées dans cet article sont celles de l'auteur et ne sauraient en aucune façon représenter l'opinion ou la ligne de conduite de l'Association canadienne des optométristes.

It is generally agreed that Canadian national health insurance has done well over its first two decades of existence in achieving a viable mixture of patient satisfaction, expenditure control and producer acceptance. Patient-consumers have remained satisfied that they are receiving optimal access to top quality care, health expenditures as a proportion of gross national product have been held almost constant, and medical and hospital associations have remained convinced that the budgets allotted for their groups are fair, if not optimal (Brown, 1983, pp. 90-95; and Brown, 1987, pp. 34-38).

When a system is as successful as Canadian national health insurance has been, it is always difficult to contemplate change. There is always the fear that any change will ultimately hurt rather than help. However, change must be contemplated because, although the Canadian system is good, it still has some major problems. For example, it provides far too much unnecessary care to patients — the estimates of unnecessary care in the case of surgical interventions range from 20 to 40 per cent (Brown, 1987, pp. 11-14, 23-24, 55-61, 67-74 and 85-89). Also, it defines markets institutionally rather than analytically — under both the *Medical Care Act*, 1966 and the *Canada Health Act*, 1984, insured ambulatory care amounts to physician care and insured institutional care amounts to hospital care. While these definitions have advantages in terms of simplicity and ease of measurement, they promote public funding monopolies for particular institutional forms, making it difficult for alternative supply arrangements to evolve.

The adoption of institutional definitions of insured health care services was a convenient way of introducing national health insurance, but it would be undesirable if these definitions were to become entrenched. For a functioning national health insurance system, a gradual evolution towards analytical definitions is necessary if the health care sector is to have the needed flexibility to evolve and innovate. In general, one does not want institutional care provided in hospitals rather than in nursing facilities, special care homes, or some other residential arrangement; or ambulatory care provided by physicians rather than by optometrists, podiatrists, or some other kind of practitioner; just because of the funding arrangements. Such restrictions on the ways of providing services promote sub-optimal patterns of care relative to patients' needs, and unnecessarily high production costs.

In what follows, these issues are analyzed in respect to one type of ambulatory care — vision services. It is an interesting area to consider because a substantial amount of eye care is already provided by non-physicians (i.e., optometrists).[1] Depending upon the evolution of provincial medical insurance

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plans, the non-physician care should be artificially restricted, or allowed to expand in accordance with competitive developments. The public policy issue is which evolution is in the social interest, or indeed whether it makes much difference.

The Market for Eye Care Services — Institutional Features

There are three major kinds of health manpower involved with eye care — optometrists, ophthalmologists, and opticians. The first two are primary contact professionals who provide services to patients directly and who customarily act as agents for patients to ensure that the latter receive optimal eye care. Of the two types of primary contact professionals, optometrists are the more numerous (in Canada in 1985, there were 2,386 active optometrists and 894 ophthalmologists) and the better known to the general public (Health and Welfare Canada, 1988, pp. 145, 186). Optometrists are trained to provide visual examinations, and to prescribe eyeglasses and contact lenses which compensate for vision deficiencies. The more expensively trained type of eye professional is the ophthalmologist. Ophthalmologists are physicians who, on completion of medical degrees, have taken a further three or four years of specialized training in eye diseases and injuries, and in corresponding medical and surgical therapies.

The final group of health manpower involved with eye care are the opticians. Opticians are health workers trained in the technical aspects of interpreting lens prescriptions and in preparing, fitting and dispensing optical appliances. In effect, opticians make most of the lenses for eyeglasses, and either sell them directly to patients through optical centers, or else produce them for optometrists who supply them to patients as a component of complete eye care services. In Canada in 1985, there were 3,293 active opticians, or about one optician per primary contact eye professional (Health and Welfare Canada, 1988, p. 139). About 70 per cent of the output of opticians was sold through optical centers while the remaining 30 per cent was dispensed through optometrists' offices.[2]

In theory, the training programs of the three kinds of health workers promote a complementary relationship between opticians and primary contact eye professionals, and a minimal amount of professional overlap between optometrists and ophthalmologists. The complementary relationship between opticians and primary contact professionals functions more or less as expected, but the non-competitive relationship between optometrists and ophthalmologists does not. According to Health and Welfare, 29.7 per cent of all ophthalmologists' services involve special eye exams, 19.1 per cent involve complete eye exams, and 14.8 per cent involve consultations (where eye examinations are involved) (Health and Welfare Canada, November 1984). According to the study by Wattie, Le Riche, and Langer, about 56 per cent of all patient visits for both optometrists and ophthalmologists are for regular checkups (Table 1). Moreover, for both types of health professionals, about one-quarter of patient visits involve only diagnostic and no curative or corrective procedures. Finally, for both types of professionals, between 40 and 45 per cent of patient visits result in prescriptions for eyeglasses. The major difference between the two groups is that about 15 per cent of the services offered by ophthalmologists involve medical and surgical therapies.

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In effect, ophthalmologists provide eye care services that are not medically or surgically oriented a large proportion of the time and, in doing this, they compete directly with optometrists. In understanding how this competitive arrangement has evolved, it is important to understand that the physician is the only health care practitioner who is not restricted to providing only some kinds of health care services through his license. In other words, a medical doctor can legally offer not only medical care but also optometric care, dental care, podiatric care, chiropractic care, acupuncture, nursing care and any other kind of health care, if the need should arise or if it should prove profitable. This "carte blanche" power of the medical doctor has been jealously guarded, except in the case of dental care where physicians have ceased providing most teeth-related services unless a dentist is unavailable. In this case, the medical profession seems to have implicitly admitted that dentists possess skills which physicians don't. In all other cases, the medical profession has been reluctant to withdraw, either because of a belief that the non-physician professional occupying the field is incompetent (e.g., chiropractic) or because continued provision of the non-medical services is found to be profitable (e.g., optometry).[3]

The fact that physicians compete with many non-physician health professionals posed problems for the provincial governments when they originally attempted to design public medical insurance programs which would comply with the *Medical Care Act*, 1966. Under the Act, the federal government offered to pay half the operating costs of any program which provided comprehensive public insurance for the services of all physicians, but the offer did not extend to the services of any non-physician fee-for-service health professional and this posed a policy problem wherever physicians and non-physicians were in direct competition.

Consider the problem in relationship to eye care, where ophthalmologists were heavily involved in the provision of optometric services. Provincial governments had essentially three options in setting up their "medicare" plans. They could have decided to eliminate all primary vision services from medicare coverage, whether these services were offered by ophthalmologists or optometrists. Exercising this option would have posed political difficulties insofar as it would have required at least implicit agreement from the federal government that vision services were non-medical, and insofar as it required the medical profession to accept a constraint on its therapeutic domain. Alternatively, the provincial governments could have decided to insure primary vision services only when they were offered by ophthalmologists. Such a policy would have been extremely inequitable, not only to optometrists but also to their patients and it also had potential for increasing eye care costs over the long run.

The option decided upon by provincial

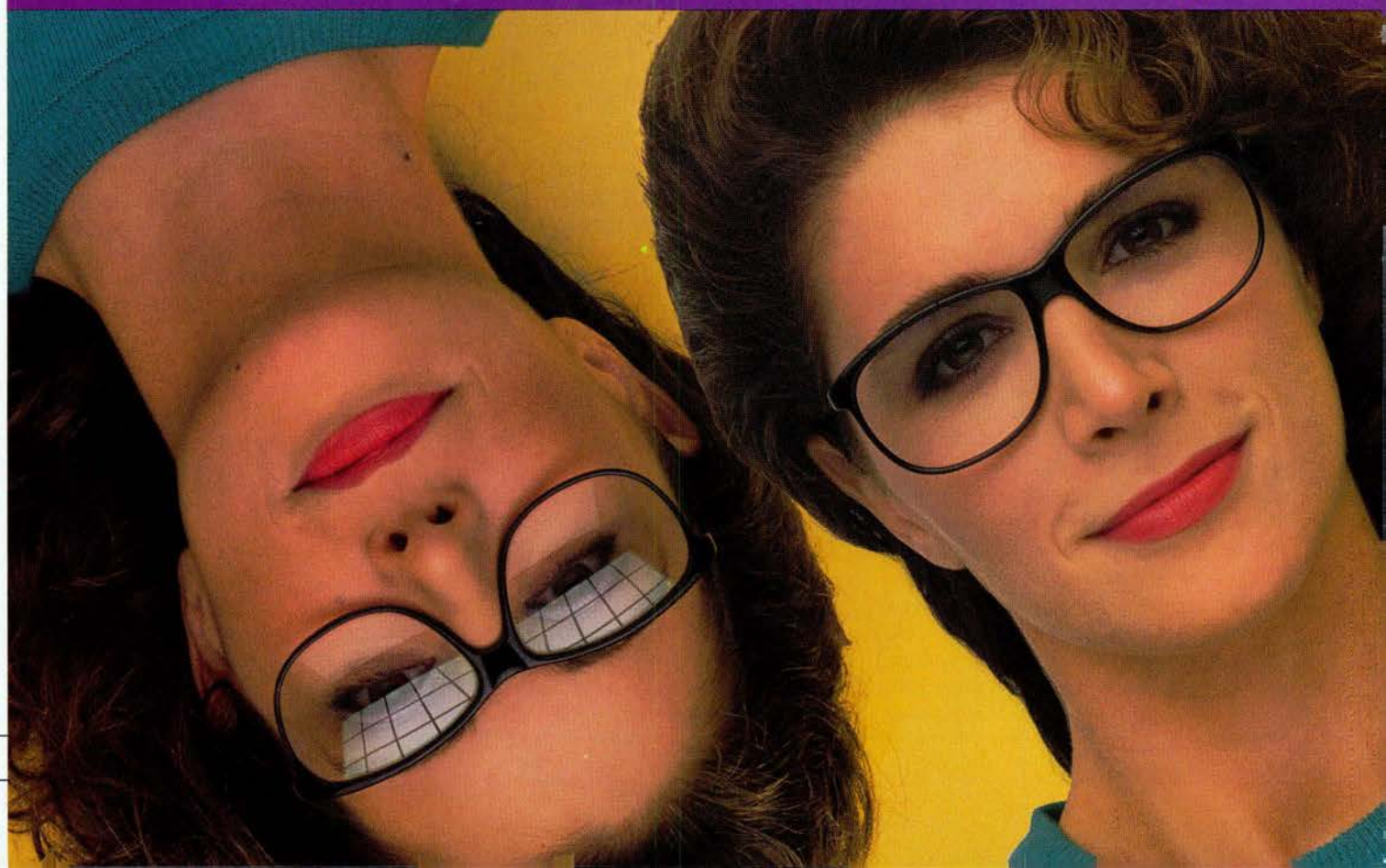
governments was to partially subsidize those services of optometrists which were also offered by ophthalmologists. Typically, optometrists were given one insured service involving an eye examination, a refraction and a writing of a prescription for glasses, which they were allowed to offer patients not more than once a year. The size of the insurance benefit was determined by each provincial government unilaterally and was usually set at a level significantly lower than that paid ophthalmologists. For example, in Alberta, the 1986 ''medicare'' benefit payment for an optometric vision examination was $24.85, while for an unreferred complete examination of the eyes by an ophthalmologist it was $31.75, and for a physician referred ophthalmologic examination it was $44.77 (Alberta Association of Optometrists, and Alberta Hospitals and Medical Care). In all cases, the fitting and purchase of glasses was not considered for ''medicare'' coverage, since this was not an activity engaged in by ophthalmologists.

The insurance arrangements devised by provincial governments encouraged optometrists to rely partially on patient charges in order to obtain customary fees. The practice proved competitively viable because most ophthalmologists extra-billed as well, even though they received higher ''medicare'' payments than did the optometrists.[4]

The competitive pricing arrangement between optometrists and ophthalmologists remained more or less stable until the mid-1980's. At that time, two significant changes in public policy started to evolve. The first change was caused by the passing of the *Canada Health Act*, 1984, which provided provincial governments with a strong financial inducement to eliminate physician extra-billing, including that done by ophthalmologists on eye examinations. By late 1986, all provincial governments had passed legislation phasing out physician extra-billing. The second change was the increased efforts of provincial governments to constrain the growth in public sector health costs in the aftermath of the early 1980's recession. In the main, these efforts were directed at saving costs by reducing public sector support for health services not protected under the *Canada Health Act*. It was in this context that the Alberta government eliminated its medicare payment for eye examinations provided by optometrists in August 1987 (The Alberta legislation formally eliminated coverage for all examinations designed to identify vision deficiencies for patients between the ages of 18 and 64, whether the examination was provided by an optometrist or an ophthalmologist. However, the ophthalmologist can still claim against ''medicare,'' either by doing the exam as a referral from a general practitioner, or by claiming that the exam is designed primarily to detect medical problems).[5]

> The fact that physicians compete with many non-physician health professionals posed problems for the provincial governments when they originally attempted to design public medical insurance programs which would comply with the *Medical Care Act*, 1966.

In summary, Canadian public policy changes since 1984 have been pushing user charges of ophthalmologists down and user charges of optometrists up, with



the changes in Alberta representing rather extreme variations in these directions. Eventually, this will change the structure of the market for eye care services, with significantly more care being provided by ophthalmologists and less by optometrists. Of course, the fact that most of the changes in funding policies are recent, coupled with the fact that market adjustments in the health care sector are typically slow, makes it impossible to detect any changes in market shares between optometrists and ophthalmologists as yet. But American developments in respect to their Medicare program (which, it might be recalled, is not a universal program like Canada's, but a program involving partial subsidization of most physician and hospital services provided to individuals over 65) provides a hint as to what the magnitude of the eventual adjustment might be. When the U.S.A. Medicare program was implemented in 1965, approximately 61 per cent of the elderly received vision services from optometrists and 39 per cent received vision services from ophthalmologists — percentages comparable to the utilization patterns for individuals under 65. However, Medicare insured vision services only if they were provided by ophthalmologists. By the early 1970's, approximately 65 per cent of the elderly were going to ophthalmologists for vision services although for younger age groups the ratio was still only about 40 per cent. Effectively, the pricing changes brought about by the American Medicare program caused optometrists to lose about one-fifth of the market involving elderly patients.

> Consider the problem in relationship to eye care, where ophthalmologists were heavily involved in the provision of optometric services.

The Market for Eye Services — Theoretical Considerations

To the extent that public policy changes reduce the competitive viability of optometrists in the market for primary vision services, the *a priori* expectation is lowered social welfare in the long run. The lower welfare occurs in part because patient-consumers receive a mix of eye care services which are sub-optimal in terms of meeting health care needs, and in part because the cost of eye care is increased.

The notion that eye care services could diminish in quality as one substitutes more expensively trained health professionals (i.e., ophthalmologists) for less expensively trained ones (i.e., optometrists) initially sounds contradictory. Here, it is necessary to understand that more training does not necessarily imply more expertise in a particular area. About half of an ophthalmologist's training involves undergraduate work (leading to an M.D.), and in this work optometric procedures are largely ignored. The other half involves specialty training concentrating on procedures available for coping with injuries and diseases of the eye. By way of contrast, most of an optometrist's training, insofar as it relates to the provision of health services, is concentrated on vision testing and on how to correct for deficiencies through prescription spectacles.

Perhaps the best Canadian empirical study showing that less expensively trained workers sometimes do better

quality work than more expensively trained ones involves the comparison of children's dental work done by dental nurses and by dentists in Saskatchewan. In respect to fillings, the study proceeded by having quality evaluations of the work done on 410 children, where the three specialist dentists from outside the province who made the evaluations were not told who had done the work. Of 2,107 fillings evaluated, later matching up showed that 71 per cent had been provided by dental nurses and 29 per cent by dentists. Forty-eight per cent of the nurses' work was rated as superior, 49 per cent as adequate, and 3 per cent as unacceptable; the respective ratios for dentists' work was 17 per cent, 62 per cent and 21 per cent (Saskatchewan Department of Health).

> In summary, Canadian public policy changes since 1984 have been pushing user charges of ophthalmologists down and user charges of optometrists up, with the changes in Alberta representing rather extreme variations in these directions.

Although there is no comparable study evaluating the work of optometrists and ophthalmologists, preliminary assessments suggest that the same kind of conclusion may pertain. Consider the following comments by Wattie, Harding and Langer, drawn from the concluding chapter of their study on *Vision Care: A Survey of Optometrists in Ontario*:

> Optometrists carry out extensive and comprehensive testing of the eye and vision in their routine assessments. An average of 20 procedures (is) carried out in each examination recorded. ...Optometrists in their examinations carry out twice as many procedures as ophthalmologists (B. Wattie et al., p. 58).

Optometrists themselves suggest that they see only about 0.67 patients per hour while ophthalmologists manage three (Nova Scotia Association of Optometrists). Insofar as optometrists work more slowly and carry out more procedures per patient, the comparative work profile between them and ophthalmologists is similar to that between dental nurses and dentists (Brown, 1981, pp. 169-181).

In addition to the quality and comprehensiveness of vision tests conducted, there is another dimension to the quality of health care argument. There is financial incentive for ophthalmologists to conduct routine eye examnations as a method of generating ophthalmologic business. To the extent that ophthalmologists engage in excess diagnostic testing in the search for diseases and injuries of the eye, and to the extent that ineffective technologies are employed when these diseases and injuries are detected, the problem of unnecessary care is exacerbated by using ophthalmologists rather than optometrists for vision testing.

Policy induced shifts in the mix of ophthalmologists and optometrists have, of course, cost as well as quality of care ramifications. In regard to costs, the most obvious fact is that it is significantly less expensive to train an optometrist than an ophthalmologist. As of 1983 at the University of Waterloo (which is presently the only English speaking university in Canada that trains optometrists), the optometry program had a two year undergraduate pre-professional studies requirement and a four year professional curriculum. The University received $15,420 per student for pre-professional studies, and $46,260 per student for professional training, resulting in a total

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TABLE 1
Patient Eye Care Visits by Patient Reason for Visit and by Type of Treatment Provided (Per Cent)

	Optometry	Ophthalmology
Patient Reason for Visit		
Regular Checkup	55.7	55.7
Refraction	25.2	10.0
Contact Lens	4.1	0.0
Ocular Disease or Injury	2.5	26.6
Other	12.5	7.7
Total	**100.0**	**100.0**
Type of Treatment Provided		
No Treatment	30.2	30.8
Glasses	52.2	47.0
Contact Lens	5.0	0.0
Orthoptics and Vision Therapy	3.0	0.0
Further Assessment	14.0	15.0
Medication	0.0	12.5
Surgery	0.0	3.6
Referral	12.8	1.6
Total	**117.2**	**110.5**

Note: The percentages add up to more than 100 for type of treatment provided because some patients receive more than one treatment during a visit.

Source: B. Wattie, W. Harding Le Riche, and M. Langer, *Vision Care — A Survey of Optometrists in Ontario*, published by the Department of Preventative Medicine and Biostatistics, Faculty of Medicine, University of Toronto, 1980, pp. 48, 56.

cost per optometrist of $61,680.[6] By comparison, the ophthalmology program had a four year undergraduate pre-professional studies requirement, a four year professional curriculum leading to an M.D., and a four year post-graduate curriculum leading to specialization. The University received $30,840 per student for pre-professional studies, $77,100 for professional training, and $77,100 for specialty training, resulting in a total cost per ophthalmologist of $185,040. In effect, from high school, it takes a student twice as long, and costs three times as much, to become an ophthalmologist as it does to become an optometrist.

Since optometrists are lower cost health professionals than ophthalmologists, their presence in the market for vision services constitutes an automatic pressure for lower market prices. The results of this pressure are not always easy to identify in a system with public funding, but they exist nevertheless. Consider the fact that, in Alberta, the fee charged by ophthalmologists for a complete examination of the eyes has typically been only about 15 per cent higher than that charged by optometrists, and generates a lower hourly rate of pay than ophthalmologists earn in their medical and surgical work.[7] In the absence of competitive pressure from the optometrists, there would be economic incentive for ophthalmologists to press for "reform" of the medicare fee schedule, which would bring the fee for vision testing into line with the fees for the higher priced ophthalmologic services.

The Market for Eye Services — Empirical Relationships

While there are not as much data with respect to vision care in Canada as one would like, there are some, and the data which are available corroborate the view that optometrists and ophthalmologists are highly competitive types of health manpower. Consider the data in Table 2. Among other things, these data show that the coefficient of correlation between the per capita numbers of optometrists and ophthalmologists in Canada is 0.78, while the coefficient of correlation between the per capita expenditures on optometry and ophthalmology is 0.97. High positive correlations of this nature are consistent with the hypothesis that the markets of optometrists and ophthalmologists are interdependent.

The data in Table 2 provide the basis for the following multiple regression estimate:

1. $Q_{EV} = 2349 + 5137\ D - 1695\ O + 225\ T$
$R^2 = 0.93$
(t) (2.80) (11.78) (−11.44) (2.59)
$F = 50.51$
$DW(2gaps) = 1.46$
$Obs = 15$

> To the extent that ophthalmologists engage in excess diagnostic testing in the search for diseases and injuries of the eye, and to the extent that ineffective technologies are employed when these diseases and injuries are detected, the problem of unnecessary care is exacerbated by using ophthalmologists rather than optometrists for vision testing.

where Q_{EV} is the number of special eye exams conducted by physicians, D is the number of ophthalmologists, and O is the number of optometrists, all measured per 100,000 population. The remaining variable, T, is a time trend with a value of zero in 1981. The regression indicates that one more ophthalmologist per 100,000 population leads to 5,173 more physician eye exams, while one more optometrist leads to 1,695 fewer. In other words, ophthalmologists and optometrists are substitute types of manpower as far as the production of eye examinations is concerned.

The fact that the negative coefficient of O in equation 1 has an absolute value about one-third the size of the positive coefficient of D indicates that the vision tests of optometrists are not perfect substitutes for those of ophthalmologists. This could be so because many ophthalmologic eye examinations occur when there is an *a priori* suspicion of injury or diseases.

Besides reflecting the competitive relationship between optometrists and ophthalmologists, the statistics in Table 2 provide increased detail on the profile of an average ophthalmologist's practice. They indicate that about thirty-six per cent of an average ophthalmologist's services involve special eye exams, one per cent relate to cataract surgery, and the remaining sixty-three per cent relate to other types of care.[8] The respective break-down for expenditure on these services is thirty-six per cent, twelve per cent and fifty-two per cent. Of couse, without information on physician time allocations to these various types of services, it is not possible to ascertain what the figures imply about hourly rates of pay.

The activity of ophthalmologists in respect to cataract surgery has been of special interest to many analysts because of the suspicion that this is an area where much unnecessary care might exist. Integral to this suspicion has been the American evidence showing that the rate of eye surgery under their Medicare program is in excess of 10 times what it is in most developed countries, with no commensurate reduction in eye morbidity or blindness (Dawson, pp. 493-501). Rates of eye surgery of this magnitude are not detectable in the Canadian data, but the following multiple regression based on the statistics in Table 1, suggest that an excessive servicing problem might exist:

2. $\ln Q_c = 3.79 + 1.00\ \ln D + 0.11\ T$
$R^2 = 0.91$
(t) (23.85) (7.35) (7.93)
$F = 63.12$
$DW(2gaps) = 0.91$
$Obs = 15$

In this regression, Q_c is the number of cataract surgery interventions per 100,000 population, while D and T are defined as in equation 1. Equation 2 indicates that a one per cent increase in the number of ophthalmologists leads to the same percentage increase in the number of cataract surgery interventions, other things being equal — a magnitude which favours the hypothesis that cataract surgery at the margin is supply rather than demand determined.

> In effect, from high school, it takes a student twice as long, and costs three times as much, to become an ophthalmologist as it does to become an optometrist.

Equation 2 also indicates that there was a strong upward trend in the per capita number of cataract surgery interventions during 1980-84, of 11 per cent annually on average.[9] This trend is discernible by direct inspection of the data — in Eastern

Canada, the number of cataract surgery operations per 100,000 population increased from 117 in 1980-81 to 158 in 1984-85; in Central Canada, the number increased from 147 to 224; and in Western Canada, the number increased from 132 to 245. These rates of increase are expensive to sustain, and so their clinical legitimacy must be given careful analysis and attention.

Because data on optometric care are not available, the statistics in Table 2 provide minimal insights about the practice of optometry. The main insight is that the market for eyeglasses is no more integrated with optometry than it is with ophthalmology. In this regard, it is of note that the coefficient of correlation between the per capita expenditure on eyeglasses, measured in 1981 dollars, and the per capita number of optometrists is 0.65; while the coefficient of correlation between this expenditure and the per capita number of ophthalmologists is 0.79.

The data in Table 3 provide a somewhat more detailed profile of optometric practice than the data in Table 2, both absolutely and in comparison with ophthalmology. These data indicate that, as of 1986 in Alberta, the average optometrist had a gross income of about $96,899, of which 43 per cent was derived from payments by Alberta Health Care and the remaining 57 per cent came from patient fees. About 45 per cent of the gross income constituted expenses, leaving the average optometrist with a net income of $53,295.[10] By comparison, the average ophthalmologist had a gross income of about $217,870, of which 94 per cent came from "medicare" and about 6 per cent from extra-billing. About half of the ophthalmologist's gross income represented expenses, leaving a net income of $115,399.

Because optometrists are paid only about half as much as ophthalmologists,

TABLE 2
Statistics on Ophthalmologic and Optometric Services for Canada's Eastern, Central and Western Regions, 1980–81 and 1984–85

Fiscal Year	Manpower Per 100,000 Pop.		Physician Services Per 100,000 Pop.			Expenditures Per Capita in 1981 Dollars				
	Ophthal.	Optom.	Special Eye Exams	Cataract Surgery	All Ophthal.	Special Eye Exams ($)	Cataract Surgery ($)	All Ophthal. ($)	Eye Glasses ($)	All Optom. ($)
					Eastern Region					
1980	2.60	5.60	5 624	117	12 095	1.04	0.29	2.33	10.66	2.06
1981	2.54	5.81	5 563	115	12 603	1.03	0.28	2.39	11.67	2.04
1982	2.66	6.64	5 854	128	14 125	1.07	0.30	2.73	13.23	2.34
1983	2.68	6.73	5 325	133	14 535	0.95	0.34	2.82	14.59	2.54
1984	2.61	6.78	4 783	158	14 509	0.86	0.43	3.00	15.25	2.77
					Central Region					
1980	3.49	8.56	4 871	147	17 724	1.04	0.40	3.94	14.28	3.15
1981	3.49	9.33	4 786	147	17 768	1.04	0.41	3.97	16.11	3.28
1982	3.59	9.62	4 893	167	18 582	1.08	0.46	4.13	17.32	3.40
1983	3.61	9.92	4 908	199	19 638	1.12	0.54	4.33	19.34	3.74
1984	3.64	9.93	4 807	224	20 236	1.11	0.63	4.44	20.29	4.05
					Western Region					
1980	3.49	7.22	8 509	132	17 053	1.62	0.33	2.85	15.34	2.66
1981	3.52	7.35	8 237	145	17 800	1.61	0.36	3.06	17.25	2.59
1982	3.60	7.71	8 149	174	18 249	1.55	0.38	3.21	19.15	2.72
1983	3.56	7.77	7 846	218	18 665	1.47	0.43	3.32	20.94	2.93
1984	3.56	7.93	7 832	245	19 071	1.44	0.47	3.42	21.86	3.24
					Coefficients of Correlation					
	1.00	0.78	0.32	0.64	0.95	0.59	0.63	0.75	0.79	0.74
		1.00	−0.28	0.60	0.87	0.01	0.84	0.99	0.65	0.95
			1.00	0.17	0.19	0.95	−0.26	−0.35	0.35	−0.28
				1.00	0.78	0.30	0.82	0.62	0.93	0.74
					1.00	0.45	0.80	0.84	0.89	0.87
						1.00	−0.03	−0.07	0.50	−0.02
							1.00	0.87	0.76	0.95
								1.00	0.63	0.97
									1.00	0.72
										1.00

Notes: (1) The eastern region is Nfld., PEI, NS and NB; the central region is Que. and Ont. and the western region is Man., Sask., Alta., and B.C.

(2) Except for eyeglasses, the expenditure data pertain to public sector expenditures only.

(3) Expenditures on special eye exams, cataract surgery and all ophthalmology services are deflated by medicare fee indices, specially adjusted to account for inter-regional price differences. Eyeglasses and optometry expenditures are deflated by the GNP implicit price deflator (by Health and Welfare Canada).

Sources: (1) Health and Welfare Canada, *Utilization of Physicians' Services, Canada, by Region, 1980–81 or 1984–85*, Oct., 1987.

(2) Health and Welfare Canada, *National Health Expenditures in Canada, 1975–1985*, Nov., 1987.

both on a net and on a gross basis, the cost of eye care services decreases the more optometrists there are relative to ophthalmologists. Consider the following regression estimate based on the data in Table 3:

$$3.\quad E = 17.20 + 1.84\ (O + D) - 34.75\ \frac{O}{O+D}$$

$$R^2 = 0.94$$

$$(t)\ (2.38)\quad (7.17)\qquad (-4.83)$$

$$F = 67.84$$

$$DW = 2.60$$

$$Obs = 11$$

where E is the total per capita expenditure on both optometry and ophthalmology (deflated to 1981 dollars), O is the number of optometrists per 100,000 population, and D is the number of ophthalmologists per 100,000 population. It is impossible to say, how much reliance can be placed on equation 3 as the basis for a health manpower policy designed to reduce health care costs. But to the extent it can be relied upon, equation 3 implies that a one per cent increase in the number of optometrists, and a corresponding decrease in the number of ophthalmologists, reduces expenditures on vision care, excluding eyeglasses, by 2.19 per cent.[11]

Implications for Public Policy

The analysis to this point suggests that national health insurance arrangements in Canada have the potential for discouraging eye care by optometrists in favour of that by ophthalmologists. In a statistics sense, this is economically undesirable because it encourages patients to utilize a sub-optimal mix of health care services produced at unnecessarily high total social cost. In a dynamic sense, it is economically undesirable because it restricts the ability of the health delivery system to innovate and evolve. As an example of this latter problem, a fairly persuasive argument can be made in favour of experimentation with an HMO style of organization directed at the provision of complete eye care services.[12] Such an organization would require a combination of optometrists and ophthalmologists working together as a team in a clinic setting. Unfortunately such experimentation is not likely to take place as long as Canada maintains present health funding procedures.

> In other words, ophthalmologists and optometrists are substitute types of manpower as far as the production of eye examinations is concerned.

In evaluating the economic effects of public funding, it is important to understand that manpower availability in the health care sector adjusts slowly. For example, in the Alberta situation where ophthalmologic vision tests are now often fully subsidized and optometric vision tests are available only at full cost, the weakening in the competitive position of optometry is substantial. But it will probably take at least a decade for the shift in market shares to become self-evident. In the interim, established optometrists can cushion the impact on their practices in a variety of ways — by accepting lower prices for vision tests, by offering better bargains in respect to the sale of eyeglasses, or even by modifying working hours to provide greater convenience for patients. As far as patients are concerned, they will continue for a period to patronize customary eye care providers, sometimes because current providers are physically much closer than alternative providers (an advantage which optometrists often have over ophthalmologists in rural areas), and sometimes because patients prefer continued contact with a known provider to initial contact with a new one. But eventually conditions shift. New ophthalmology practices set up which are more conveniently located for many optometric patients, and many optometric patients eventually must be referred to ophthalmologists because of

TABLE 3
Selected Manpower and Expenditure Statistics Pertaining to Eye Care in Alberta, 1975–1986

Year	Ophthalmology				Optometry				Opticians	Other Eye Care Expenditures	
	Number Per 100,000 Pop.	Expenditures Per Capita			Number Per 100,000 Pop.	Expenditure Per Capita			Number Per 100,000 Pop.	Expenditures Per Capita	
		Medicare ($)	Other ($)	Total ($)		Medicare ($)	Other ($)	Total ($)		Eyeglasses ($)	Total Exp. ($)
1975	3.25	2.12	0.13	2.25	8.73	1.57	4.43	6.08	10.01	8.45	16.78
1976	3.20	2.38	0.14	2.52	9.05	1.73	4.44	6.17	11.48	9.21	17.90
1977	3.08	2.45	0.15	2.60	8.40	1.92	4.40	6.32	8.86	10.06	18.98
1978	2.92	2.62	0.18	2.80	8.35	2.08	3.75	5.83	10.77	10.97	19.60
1979	2.86	2.93	0.18	3.11	8.44	2.31	4.21	6.52	11.49	11.64	21.27
1980	2.79	3.35	0.18	3.53	8.47	2.65	4.23	6.88	11.12	12.61	23.02
1981	2.81	3.93	0.23	4.16	8.37	3.05	4.29	7.34	11.62	15.23	26.73
1982	2.63	4.29	0.26	4.55	8.31	3.26	4.47	7.73	12.41	17.92	30.20
1983	2.64	4.58	0.28	4.86	8.39	3.50	4.68	8.18	12.74	20.32	33.36
1984	2.64	5.10	0.31	5.41	8.59	3.65	5.07	8.72	13.19	22.16	36.29
1985	2.63	5.73	0.34	6.07	9.03	3.92	4.83	8.75	14.54	23.14	37.96
1986	2.78	6.72	n.a.	n.a.	9.04	3.95	n.a.	n.a.	n.a.	n.a.	n.a.

Notes: (1) "Other" ophthalmology expenditure data are extrapolated from Canadian data, which give the ratios of public expenditure on physician services to to other expenditures on physician services.

(2) "Other" optometry expenditure data are estimated from Canadian data, prorating the income to Alberta according to the per cent active Canadian optometrists residing in Alberta.

Sources: (1) Alberta Hospitals and Medical Care, *Alberta Health Care Insurance Plan*, various issues.

(2) Health and Welfare Canada, *National Health Expenditures in Canada, 1975-1985*, 1987.

(3) Health and Welfare Canada, *Health Personnel in Canada, 1986*, 1988.

eye injuries or diseases.

If the problems of adjusting to the funding induced adverse market conditions are frustrating but manageable for established optometrists, they are more difficult for recent graduates. The new practitioner does not have continuity of contact with a large group of patients, and he or she must try to attract a patient load with a set of user fees that are higher than those of ophthalmologic competitors. This is why, in attempting to estimate manpower adjustments in respect to market changes, it is common to look at the attrition rate of established practitioners from retirement and death, and the net migration rate which involves mostly new and young health professionals. In relation to optometry, the natural attrition rate is probably between ½ and 1½ per cent. Net interprovincial migrations, on the other hand, could involve as many as 10 per cent of the employed manpower in any one province, although a rate below 5 per cent is much more likely.[13] The adjustment migration rate is, of course, not a constant but tends to decline as one approaches a new equilibrium manpower distribution.

If the problems of adjusting to the funding induced adverse market conditions are frustrating but manageable for established optometrists, they are more difficult for recent graduates.

Because health manpower adjustments are slow, there is a tendency to assume that funding policies like Alberta's towards ophthalmology and optometry probably don't change things; but if and when they do, the policies can be quickly and easily reversed. The assumption is a poor one. In the health care sector, physicians represent the pinnacle of the "pecking order" and consequently it usually is easy politically to make policy changes that favour them, but difficult to make changes that don't. By contrast, practitioners like optometrists, podiatrists and chiropractors are further down the "pecking order" and their competitive positions are usually adversely affected not only by government funding arrangements but also by ongoing criticisms by the medical profession on the inadequacies of their training programs. These criticisms gain political power, the fewer non-physician practitioners there are, and the less contact that patient-consumers have with them.

Within the health care literature, there has always been considerable support for more reliance on relatively inexpensively trained manpower which could substitute for physicians in the provision of the more mundane medical tasks. The substitute professional has typically been identified as a "nurse practitioner." In regard to this literature, two things are of note. First, it has been almost impossible to introduce a new health professional called a nurse practitioner and this has been in part because the medical profession has been able to mobilize patient-consumer fears about health professionals with medium levels of training (Spitzer). Second, existing manpower like optometrists, podiatrists and chiropractors are already playing a "nurse practitioner" type of role within a limited domain of health care activity.[14] It would be economically undesirable if these substitutes were restricted in the interest of medical orthodoxy which favours a particular institutional way of doing things.

In regard to vision care services, the above consideration suggests the following guideline for public funding policies. Where ophthalmologists and optometrists produce exactly the same services, and are in direct competition with each other, the government funding arrangements should be defined entirely in relation to the services, and not in relation to the type of health professional supplying them. Needless to say, this guideline is relevant not only to the relationship between ophthalmologists and optometrists, but also to the relationship between all physicians and all non-physicians producing the same type of ambulatory care, and to all hospitals and all other residential arrangements producing the same type of institutional care. Only when markets are defined in terms of products, and not in terms of the characteristics of suppliers, can there be a reasonable expectation that least-cost methods of production will come to the fore, and that the system will efficiently evolve and innovate as technological change occurs.

Where ophthalmologists and optometrists produce exactly the same services, and are in direct competition with each other, the government funding arrangements should be defined entirely in relation to the services, and not in relation to the type of health professional supplying them.

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1. *In the health care economics literature, it is conventional to separate health manpower into physicians and non-physicians, and health care into medical and non-medical kinds of services. In this classification scheme, health practitioners are all health practitioners other than physicians; and medical services are all services which only physicians are allowed to provide. For convenience, these definitions are adopted in this paper, although it is realized that they are not universally preferred.*

2. *Canadian expenditure on eyeglasses in 1981 was $292 million, of which $190 million involved expenditures in optical centers and $82 million involved expenditures in optometrists' offices (Health and Welfare Canada, December 1984).*

3. *It is important to realize that the medical profession's views about the lack of competence of non-physicians and about the inadequacies in non-physician training programs have generally not been based on methodical empirical evaluations but most often on an untested conventional wisdom about these matters.*

4. *In Alberta, the typical extra-bill for a primary vision exam during 1985-86 was $10 to $15, whether the service was provided by an optometrist or an ophthalmologist.*

5. *It is a matter of interest that in mid-1988 (after this paper was completed) the Alberta Government reinstated medicare coverage for optometric services, probably as an aspect of early pre-election campaigning.*

6. *Funding for Ontario universities is based on accounting units known as basic income units (BIU's). In 1983, a BIU was worth $3,855, and each university received 2 BIU's for each undergraduate student taught during an academic year, 3 BIU's for each optometric student taught, and 5 BIU's for each medical student taught. The BIU includes both student fees and government grants, but since they are units designed for determining university funding, they do not include training costs which result from student income foregone.*

7. *According to unpublished Revenue Canada statistics, the average net income for a full-time self-employed ophthalmologist was $106,969 in 1983, while the average net income for a full-time self-employed optometrist was $53,682. Other average net incomes in 1983 were $89,141 for all self-employed physicians, $76,726 for all self-employed dentists, $61,646 for all self-employed lawyers, $51,417 for all self-employed accountants, and $45,141 for all self-employed engineers and architects.*

8. *Special eye examinations include examinations and assessments of the eye including refraction and tonometry, and supplement examinations and repeats.*

9. *The proportion of the Canadian population that is over 65 years of age is increasing by only about 0.5 per cent annually, and so an aging population in and of itself is not able to explain the strong upward trend in cataract surgery.*

10. *As the data are collated for Table 3, optometric expenses do not include the purchase cost of glasses from opticians.*

11. *The estimate of cost reduction in the text is based on an assumption that the initial stocks of optometrists and ophthalmologists per 100,000 population are 9.04 and 2.78 respectively.*

12. *A health maintenance organization (HMO) is an organization involving a complex of clinics and hospitals which offers a specific set of health care services to a group of subscribers who prepay for their care by means of fixed periodic premiums.*

13. *Data on neither attrition rates nor net migration rates are available for optometrists, so the estimates in the text are based on an assumption that optometric manpower markets are comparable to physician markets in these regards (Brown, 1987, p. 112).*

14. *The analogy between nurse practitioners and health care providers like optometrists and podiatrists is often not appreciated because nurse practitioners evoke an image of personnel who are female and salaried while optometrists and podiatrists are more likely to be male and fee-for-service.*

Contact Lens Wear in the Dry Eye Patient: Predicting Success and Achieving It

L. Sorbara *
C. Talsky * *

Abstract

Clinical diagnosis of dry eye and its implications in successful contact lens wear has not been well defined. Two thousand patient files from the University of Waterloo, School of Optometry, Contact Lens Clinic were surveyed and 54 patients, diagnosed as having dry eye, were fit with contact lenses and were included in a retrospective prevalence study. Diagnostic procedures commonly used in the detection of dry eye were evaluated in terms of their ability to accurately predict successful lens wear in the dry eye patient. The Tear Break Up Time was found to be the most valid in identifying those patients who are less likely to achieve success. Schirmer's Test was found to be of little predictive value. Possible correlations between lens type and successful lens wear were investigated. Dry eye patients fit with low water content, thin (0.06-0.10 mm) hydrogel lenses showed a significantly higher success rate than those fit with either hydrogels of differing water content or rigid gas permeable lenses. Additional factors which may serve to increase successful lens wear are briefly discussed.

Introduction

Of the many contraindications to contact lens wear, diagnosis of dry eye is one that is surrounded by much controversy. While some practitioners feel that it would absolutely preclude the fitting of contact lenses, there are others who regard the condition as an additional challenge which must be properly managed in order to achieve a successful fit. Various studies have indicated that contact lens wear itself can cause a mild degree of dry eye[1-3]; other research indicates that lens wear may have a pos-

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TABLE 1

Patient Population

Sex	# Of Patients	% Of Patients
M	26	48.1
F	28	51.9
Total	54	100.0

Age	# Of Patients	% Of Patients
<25	28	51.9
26-35	14	25.9
>35	12	22.2

Mean = 30.5; S.D. = 13.2; Range = 11-79

Refractive Error

	# Of Patients	%	Mean	S.D.	Range
Myopia	44	81.4	−3.62D	1.82	−1.00 to −8.25
Hyperopia	5	9.3	+2.42D	2.25	+0.75 to +8.00
Astigmatism	5	9.3			
		Sphere	−2.70D	1.93	−0.50 to −5.00
		Cylinder	−2.00D	0.89	−1.25 to −4.00

Tear Break Up Time

	OD (s)	OS (s)
Mean	7.3	7.3
Standard dev.	4.3	4.3
Range	3-20	3-20
Variance	18.5	18.9

Schirmer's Test

	OD		OS	
	# Of Patients	%	# Of Patients	%
Hypersecretor	1	1.9	1	1.9
Normal secretor	20	37.0	14	25.9
Subnormal secretor	19	35.2	16	29.6
Hyposecretor	14	25.9	23	42.6

Résumé

Le diagnostic clinique de la sécheresse oculaire et ses répercussions sur la question de savoir si le client réussira à porter des verres de contact méritent un approfondissement. Les chercheurs ont consulté deux mille dossiers de clients de la clinique des verres de contact de l'école d'optométrie de l'Université de Waterloo: 54 personnes pour lesquelles on a posé le diagnostic de sécheresse oculaire ont reçu des verres de contact et ont été inscrites à une étude rétrospective de prévalence. Les chercheurs ont évalué les modalités de diagnostic utilisées couramment pour déceler la sécheresse oculaire, pour savoir si elles permettent vraiment de prévoir avec précision si la personne atteinte pourra porter des verres de contact. Les chercheurs ont constaté que le moyen le plus précis d'identifier les malades les moins susceptibles de réussir est le délai d'apparition des larmes. Ils ont constaté que le test de Schirmer avait peu de valeur prévisionnelle. Ils ont étudié les corrélations possibles entre le type de lentille et la réussite à les porter. Les personnes atteintes de sécheresse oculaire et auxquelles on a donné des lentilles minces à hydrogel (0,06 à 0,10 mm) faiblement hydratées ont eu un taux de réussite assez supérieur à celles qui ont porté des lentilles à teneur en eau différente, ou rigides et perméables aux gaz. Les chercheurs analysent brièvement les autres facteurs pouvant permettre d'augmenter le taux de réussite dans le port des lentilles cornéennes.

A dry eye is one which experiences abnormal lubrication of the cornea as a result of some disturbance in the normal tear film.

sible therapeutic role in the management of established dry eye[4-6].

A dry eye is one which experiences abnormal lubrication of the cornea as a result of some disturbance in the normal tear film. Contact lens literature has classified the various mechanisms of tear film abnormalities into five broad categories, those being 1) aqueous tear deficiency; 2) mucin deficiency; 3) lipid abnormalities; 4) eyelid-corneal surface abnormalities; and 5) epitheliopathies[1-3]. It should be noted that these abnormalities may not necessarily be intrinsic to the dry eye patient. It is well established that a variety of both systemic diseases and medications can alter the normal tear film[7,8]. In addition, there is clinical evidence suggesting a soft contact lens placed on the eye serves to disrupt the tear film to an extent which causes significantly increased tear evaporation[9].

Clinical diagnosis of dry eye itself has been subject to considerable debate among both researchers and practitioners alike. Researchers repeatedly refer to two particular tests which are commonly administered to assess the condition of the precorneal tear film; the Tear Break Up Time (TBUT) and the Schirmer Test[8,10]. It is generally accepted that a TBUT of 10 seconds or less and/or a Schirmer test result of less than 15 mm of wetting in 5 minutes is indicative of an abnormality of

TABLE 2A
Diagnostic Findings vs. Success Rate
a) TEAR BREAK UP TIME

	SUCCESSFUL Eyes #	%
>10	9	14.1
10 s	6	9.3
<10 s	49	76.6
Total	64	100.0

Not Available: 2

	NOT SUCCESSFUL			
	Refit	**Discontinued**	**Total #**	**Total %**
>10 s	2	2	4	13.8
10 s	3	2	5	17.2
<10 s	12	8	20	69.0
Total	17	12	29	100.0

Not Available: 4 + 2 = 6

b) SCHRIMER TEST

	SUCCESSFUL Eyes #	%
Hypersecretor	2	3.0
Normal secretor	14	21.2
Subnormal secretor	20	30.3
Hyposecretor	30	45.5
Total	**66**	**100.0**

	NOT SUCCESSFUL			
	Refit	**Discontinued**	**Total #**	**Total %**
Hypersecretor	0	0	0	0.0
Normal secretor	12	7	19	45.2
Subnormal secretor	6	5	11	26.2
Hyposecretor	10	2	12	28.6
Total	28	14	42	100.0

the tear film or lacrimal system. The validity of these procedures has been under scrutiny for some time; there have been reports both in favor of[11-14], and in opposition to [10, 15-17], their clinical relevance in the detection of dry eye. It has been suggested that the best two tests of the lacrimal system are a careful medical history taking, and physical examination with the slit lamp[18]. Despite conflicting views

> Hydration characteristics of hydrogel contact lenses require careful consideration when fitting the dry eye patient.

presented in the literature, assessment of the tear film generally consists of a thorough slit lamp examination (which includes measurement of the TBUT), Schirmer test, vital staining, and lysozyme content determination, although the latter is often excluded due to its impractical and controversial nature.

For those contact lens practitioners choosing not to regard dry eye as an absolute contraindication to lens wear, an important question is posed: which type of lens should be fit? First, a basic decision between soft or rigid lenses must be reached. Refractive error and keratometric findings will undoubtedly influence such a decision, but there are other factors which must also be considered. In patients with decreased aqueous tear production, acceptance of rigid contact lenses is generally lower to begin with, and the probability of production decreases[7].

> There is no well-defined procedure for choosing the most appropriate lens type for the dry eye patient; nor is there any means by which the contact lens practitioner can anticipate the degree of successful lens wear in such patients.

Gas permeable rigid lenses present an additional problem in the patient with dry eye: the surfaces of such lenses are more reactive than PMMA lenses and tend to become contaminated by products of the tear film (lipid or lipid-protein complexes) which acts to increase the drying process further.

Hydration characteristics of hydrogel contact lenses require careful consideration when fitting the dry eye patient. Lens dehydration may result in decreased vision, increased surface build-up, alterations in fitting and performance characteristics, and discomfort. These hydration changes have been given much attention in current literature. In addition, recent work has provided various equations and definitions in an attempt to further quantify such alterations[19]. Reports have indicated that while lens dehydration occurs in all hydrogel lenses regardless of water content, the greatest loss of water occurs in lenses with highest initial water content[4]. Moreover, in the eye with inadequate tears, a lens of lower water content remains hydrated to a reasonable extent for a longer period than one of higher water content. Finally, the amount of dehydration appears to be unrelated to centre thickness of a lens. In an experiment by Makie[4], a comparison of dehydration in lenses of equal water content but differing thicknesses, (two lenses of high, medium and low water content with different thicknesses) there were no significant differences in the amount of dehydration.

The effect of hydrogel lenses on the tear film must also be considered when deter-

TABLE 2B
POSITIVE HISTORY AND/OR MEDICATION

SUCCESSFUL

	Eyes #	%
Dry Eye	6	11.1
Allergies/Hayfever	8	14.8
Combinations	1	1.9
Medication:		
Birth Control Pill	2	3.7
Accutane	0	0.0
Antihistamine	2	3.7
Aspirin	0	0.0
Combinations	0	0.0
No Positive History or Medication	14	25.9
Positive History	13	24.1
Positive Medication	4	7.4
Positive History & Medication		
Total	54	100.0

NOT SUCCESSFUL

	Refit	Discontinued	Total #	Total %
Dry Eye	2	3	5	10.9
Allergies/Hayfever	2	0	2	4.3
Combinations	2	2	4	8.7
Medication:				
Birth Control Pill	3	2	5	10.9
Accutane	1	0	1	2.2
Antihistamine	0	0	0	0.0
Aspirin	1	1	2	4.3
Combinations	0	0	0	0.0
No Positive History or Medication	5	2	7	15.2
Positive History	4	2	6	13.0
Positive Medication	5	3	8	17.4
Positive History & Medication	3	3	6	13.0
Total	28	18	46	99.9

TABLE 2C
POSITIVE SLIT LAMP FINDINGS

SUCCESSFUL

	Eyes #	%
1. Tarsal Plate Abnormalities	0	0.0
2. Injection	6	18.2
3. Corneal Staining	3	9.1
4. Poor Tear Quality	1	3.0
5. Neovascularization	0	0.0
Combinations:		
1 + 2	3	9.1
1 + 3	3	9.1
1 + 4	2	6.1
1 + 2 + 3	0	0.0
1 + 2 + 3 + 4	0	0.0
1 + 2 + 4	2	6.1
1 + 3 + 4	0	0.0
2 + 3	0	0.0
Total Combinations	10	30.3
Total with Findings	20	60.6
No Findings	13	19.4
Total	33	100.0

NOT SUCCESSFUL

	Refit	Discontinued	Total #	Total %
1. Tarsal Plate Abnormalities	3	1	4	19.0
2. Injection	2	0	2	9.5
3. Corneal Staining	0	0	0	0.0
4. Poor Tear Quality	0	0	0	0.0
5. Neovascularization	0	0	1	4.8
Combinations:				
1 + 2	0	0	0	0.0
1 + 3	0	1	1	4.8
1 + 4	2	0	2	9.5
1 + 2 + 3	0	1	1	4.8
1 + 2 + 3 + 4	0	0	0	0.0
1 + 2 + 4	0	0	0	0.0
1 + 3 + 4	1	0	1	4.8
2 + 3	0	1	1	4.8
Total Combinations	5	3	8	38.1
Total with Findings	10	5	15	71.4
No Findings	4	2	6	28.6
Total	14	7	21	100.0

mining which type of lens is best suited for the dry eye patient. Such a lens placed on the eye results in tear film disruption and consequently an increased tear evaporation rate from the anterior surface of the eye[9]. This increase in evaporation rate is apparently unrelated to water lost by dehydration from the soft lens material, with dehydration being only a minor contributing factor to the total increase in evaporation. The influence of water content on evaporation rate is not well defined. Hamano et. al. suggest that a higher evaporation rate is attained for an eye with a soft lens of higher water content[20], while Cedarstaff et. al. have concluded that the increase is not consistently related to the initial water content of the lens[9].

Following the selection of appropriate lens type, factors such as water content (if applicable), care system (including daily and enzymatic cleaning regimen), adjunct use of ocular lubricants/comfort drops, wearing schedule and degree of follow-up care must be determined.

Clearly, there is no well-defined procedure for choosing the most appropriate lens type for the dry eye patient; nor is there any means by which the contact lens practitioner can anticipate the degree of successful lens wear in such patients.

The aim of this paper is twofold: first, to examine the procedures commonly employed for the detection of dry eye and to determine the accuracy of predicting the success (of failure) rate of dry eye patients. In addition, a survey of dry eye patients and lens type fitted was performed in order to ascertain which type of lens will provide the highest degree of success in such patients.

> Hydrogel lens water content was found to be significantly correlated to successful lens wear.

Methods

2,000 of the University of Waterloo, School of Optometry, Contact Lens Clinic files were surveyed and those patients diagnosed as having dry eyes were included in a retrospective prevalence study. A patient was considered to have dry eyes when 1) the TBUT was less than or equal to 10 seconds; 2) Schirmer's test without anaesthetic indicated subnormal or hyposecretion of tears; 3) corneal epithelial staining was evident at pre-exam; 4) the patient had a history of allergies with ocular effects; 5) the patient presented with history of systemic disease known to induce dry eye; 6) the patient was taking medication(s) known to induce dry eye; 7) grade II tarsal plate abnormalities (or worse) were present prior to lens wear (see Table 1 for Patient Population details). Patients were then classified as either successful lens wearers (i.e. those not requiring a change in lens type) or unsuccessful lens wearers (i.e. those requiring a change in lens type OR those required to discontinue lens wear). The results of each patient's TBUT, Schirmer's test, and slit lamp examination in addition to those factors known to induce dry eye as deter-

mined by the case history were tabulated. The validity of these findings (i.e. sensitivity and specificity) with respect to successful lens wear was determined (see Tables 2 and 3). Information regarding initial lens type, final lens type (if applicable), lens centre thickness and care system was extracted from the files and possible correlations between successful lens wear and lens type were examined (Tables 4-8).

Results

Of 2000 files surveyed, a total of 54 patients who had been fitted with contact lenses, diagnosed as having dry eye, were identified and constituted the study population. Population characteristics are summarized in Table 1.

> No conclusions regarding the least successful lens type can be extrapolated from these findings.

Part I

The diagnostic procedures were evaluated in terms of:

1) sensitivity, which refers to the proportion of unsuccessful wearers who will show a positive test result (i.e. low TBUT, abnormal Schirmer's test etc.)
2) specificity, meaning the proportion of successful wearers who are identified as such by eliciting a negative test result
3) positive predictive value (PPV), which is the probability of unsuccessful lens wear in those patients with positive test results
4) negative predictive value (NPV), the probability of successful lens wear in patients giving normal test results.

These values are found in Table 3.

TABLE 3
EVALUATION OF DIAGNOSTIC PROCEDURES

Diagnostic Procedure	Sensitivity (%)	Specificity (%)	Positive Predictive Value	Negative Predictive Value
Tear Break Up Time	88.89	14.06	36.78	69.23
Schirmer Test	54.76	45.71	31.51	45.71
Positive History:				
a) Complaints of Dry Eye	23.81	81.81	45.45	62.79
b) Allergies/ Hayfever	9.52	76.76	20.00	56.82
c) Combinations	19.05	96.97	80.00	65.31
Overall	28.57	60.61	31.58	57.14
Positive Medication:				
a) Birth Control Pill	23.81	88.57	71.43	65.96
b) Antihistamines	Not a Good Indicator			
c) Accutane	Not a Good Indicator			
Overall	38.1	87.88	66.67	69.05
Positive History & Medication	28.57	87.88	60.00	69.91
Positive Slit Lamp Findings:				
a) Tarsal Plate Abnormality	19.05	100.00	100.00	66.00
b) Injection	9.52	31.82	25.00	58.70
c) Corneal Staining	0	90.91	0	58.82
d) Poor Tear Quality	0	96.97	0	60.38
e) Combinations	38.10	69.70	44.44	63.89
Overall	71.43	39.39	42.86	68.42

TABLE 4
Patient Success Rates

	Hydrogel #	Hydrogel %	Rigid #	Rigid %	Total #	Total %
Successful Wearers	27	50.0	6	11.1	33	61.1
Refit to Achieve Success	10	18.5	4	7.4	14	25.9
Discontinued	2	3.7	5	9.2	7	13.0
Total	39	72.2	15	27.8	54	100.0

TABLE 5
Successful Hydrogel Lens Wearers

Water Content	# of Patients	% of Patients	% of all Successful Wearers
High (≥56.0%)	2	7.4	6.1
Med (38.7-55.9%)	5	18.5	15.2
Low (≤38.6%)	20	74.1	60.6
Total	27	100.0	81.9

TABLE 5 A

	Low H_2O		Med. H_2O		High H_2O	
Centre Thickness:	#	%	#	%	#	%
Ultrathin (0.035)	4	20.0	0	0	0	0
Thin (0.06-0.10)	10	50.0	0	0	0	0
Standard (0.12)	6	30.0	5	100.0	2	100.0
Type of Disinfection:						
Hydrogen peroxide	12	60.0	3	60.0	2	100.0
Cold chemical	8	40.0	2	40.0	0	0
Heat	0	0	0	0	0	0
Protein Deposition Problems	6	100.0	0	0	0	0
Use of Enzymatic Cleaners	11	100.0	2	100.0	0	0
Use of Comfort Drops	13	100.0	3	100.0	2	100.0

TABLE 6A
Unsuccessful Hydrogel Wearers

Refit to Low Water Content Lenses

Reason for refit	# of Patients	% of Patients	Refit from	# of Patients	% of Patients
Discomfort	4	50.0	High H_2O lenses	0	0
Dry eye	3	37.5	Med H_2O lenses	2	25.0
Poor vision	1	12.5	Rigid lenses	1	12.5
Total	8	80.0			

Refit to Medium Water Content Lenses

Reason for refit	# of Patients	% of Patients	Refit from	# of Patients	% of Patients
Dry eye	1	50.0	Low H_2O lenses	1	50.0
Positive slit lamp	1	50.0	Rigid lenses	1	50.0
Total	2	20.0			

After Refit

	Low H_2O		Medium H_2O	
Centre Thickness:	#	%	#	%
Ultrathin (0.035)	0	0	1	50.0
Thin (0.06-0.11)	8	100.0	1	50.0
Standard (0.12)	0	0	0	0
Type of Disinfection:				
Hydrogen Peroxide	5	62.5	2	100.0
Cold Chemical	3	37.5	0	0
Heat	0	0	0	0
Protein Deposition Problems	1	12.5	0	0
Use of Enzymatic Cleaners	3	37.5	2	100.0
Use of Comfort Drops	4	50.0	1	50.0

Tests providing high degrees of sensitivity were the TBUT (88.89%) and the presence of positive slit lamp findings (71.43%). Highly specific diagnostic aids included subjective complaints of dry eye (81.81%), a combination of one or more systemic conditions known to induce dry eye (96.97%), use of medication known to induce dry eye (87.88%), (particularly the birth control pill (88.57%), the presence of tarsal plate abnormalities (100.00%), poor tear quality (96.97%), corneal staining (90.91%), and injection (81.82%). Tarsal plate abnormalities and use of birth control pill provide significant PPV's, 100% and 71.43% respectively; NPV's of significance were afforded by the TBUT (69.23%) and use of medications inducing dry eye (69.05%). If there is a history of systemic conditions in addition to use of medication, the NPV is increased slightly to 69.91%.

> The more sensitive a test is, the better will be the negative predictive value (and hence more confidence can be placed in a patient with a negative test result as not having the condition).

Part II

Of the 54 patients constituting the study population, 33 (61.1%) of them were successful lens wearers. Overall success rates are summarized in Table 4.

The success rate was higher among hydrogel lens wearers (27 or 50.0% of all successful wearers) as compared to rigid gas permeable lens wearers (6 or 11.1%), which represents a statistically significant difference (t-test: $p>0.05$; 53 degrees of freedom).

Hydrogel lens water content was found to be significantly correlated to successful lens wear. Refer to Table 5.

A greater number of low water content lens wearers were successful (20 or 74.1%) as compared to successful patients wearing either medium water content (5 or 18.5%) or high water content lenses (2 or 7.4%) (t-test; $p>0.01$; 25 degrees of freedom). Possible statistical correlations between success rate, lens water content and centre thickness could not be determined due to insufficient information. However, the results indicated that lenses of thin centre thickness (0.06-0.10 mm)

may contribute to successful lens wear. A more controlled study would be required to eliminate observation bias and confirm such an association.

Ten (18.5%) hydrogel lens wearers required a refit to achieve success. Of these, 8 (80.0%) were refit with low water content lenses. The remaining 2 (20.0%) were refit with medium water content lenses.

Insufficient data prevented the determination of statistical relevance, but the available information seems to imply that low water content lenses serve to increase the rate of successful lens wear. It must be noted that this is by no means a definitive finding. Only two (3.7%) of the hydrogel wearers were required to discontinue lens wear; one of these patients had been wearing a medium water content lens and was discontinued due to dry eye while the other had been fit with a low water content lens but suffered from severe discomfort. See Table 6B.

> In order to attain successful lens wear in the dry eye patient, a low water content thin hydrogel lens is the lens of choice.

No conclusions regarding the least successful lens type can be extrapolated from these findings.

Of the 15 (27.8%) rigid gas permeable lens wearers, 6 (40.0%) of them were successful. Due to the small sample size, statistical evaluation of success rate vs. lens material was not possible. It is worth noting that 5 (83.3%) of these successful wearers had been fit with lenses made of silicone acrylate, while there was only one successful wearer of fluorosilicone acrylate lenses (Table 6A). A controlled study is necessary to further investigate this occurrence.

Discussion & Conclusions

Part I

Sensitive tests, i.e. tests that are usually positive in the presence of the condition being screened for, are most useful during the early stages of a diagnostic work-up, when many possibilities are being considered. In such cases, a sensitive test would serve to reduce the number of possibilities[21]. Highly specific tests, on the other hand, are beneficial when confirmation of a diagnosis is required, since these types of tests are rarely positive in the absence of the condition in question. The predictive values of a test are influenced by both sensitivity and specificity. The more sensitive a test is, the better will be the negative predictive value (and hence more confidence can be placed in a patient with a negative test result as not having the condition). Conversely, tests with a high degree of specificity will have better positive predictive values. Results indicate that the TBUT is the most sensitive diagnostic procedure followed by the positive slit lamp findings. These two tests should therefore be considered first when predicting successful lens wear in dry eye patients. A normal TBUT and/or no positive slit lamp findings (i.e. lack of inferior stippling, Bitot's spots, frothing at the lid margin and negative history of previous CL drying) suggests that successful contact lens wear is possible. In order to confirm the probability of success, procedures shown to be highly specific should be employed. The absence of any systemic condition(s) known to induce dry eye and/or a negative history of medication(s) affecting the precorneal tear film (especially the birth control pill) will validate the prediction further. The results clearly indicate that Schirmer's test without anaesthetic is not valid in either predicting or confirming successful lens wear in the dry eye patient.

> The dry eye patient should be regarded as a separate individual with specific problems and requirements.

Part II

In order to attain successful lens wear in the dry eye patient, a low water content thin hydrogel lens is the lens of choice, providing refractive error and keratometric

TABLE 6B

Discontinued Patients

Reason for discontinuation:	# of patients	% of patients
Dryeye	1	50.0
Discomfort	1	50.0
Total	2	100.0
Discontinued From:		
Low H_2O Lenses	1	50.0
Med. H_2O Lenses	1	50.0

TABLE 7

Successful Rigid Lens Wearers

	# of Patients	% of Patients
Material:		
Silicone Acrylate	5	83.3
Fluorosilicone Acrylate	1	16.7
Care System:		
Boston Solutions (preservatives EDTA and Chorhexidine)	5	83.3
Soaklens (preservatives EDTA and Thimerosal)	1	16.7
Protein Deposition Problems	1	100.0
Use of Enzymatic Cleaners	2	100.0
Use of Comfort Drops	4	100.0

TABLE 8

Unsuccessful Rigid Lens Wearers

	# of Patients	% of Patients
Reason for Refit:		
Dryeye	1	25.0
Deposits	2	50.0
Positive Slit Lamp	1	25.0
Refit From:		
Low H_2O Lenses	4	100.0
Refit to:		
Silicone Acrylate	3	75.0
Fluorosilicone Acrylate	1	25.0
After Refit:		
Care System:		
Boston Solutions	3	75.0
Duracare Solutions (preservatives EDTA & BC)	1	25.0
Protein Deposition Problems	0	0
Use of Enzymatic Cleaners	2	100.0
Use of Comfort Drops	3	100.0

findings warrant its use. The fitting of such a lens will result in fewer refits and hence an increase in patient satisfaction. For those patients in which correction with hydrogel lenses is not indicated, a gas permeable rigid lens made of silicone acrylate may be the initial lens of choice, although the data presented in this paper are not conclusive.

There are additional measures which can be taken to increase the chance for successful lens wear in the dry eye patient. Adjunct use of comfort drops was evident in the majority of successful lens wearers (both hydrogel and rigid) as well as in those patients who were refit to achieve successful lens wear (Tables 5 through 8). Although problems with protein deposition were not evident in the study patients, a large number of successful hydrogel lens wearers (including those who were refit to achieve success) were using enzymatic cleaners as an integral part of their lens care regimen. It is beyond the scope of this paper to investigate correlations between successful lens wear and the use of such products.

There is no doubt that guidelines afforded by the literature provide valuable information for the practitioner faced with a particularly challenging contact lens patient. It must be remembered, however, that each patient represents an entirely unique situation and may not fit into a well circumscribed table or list. The dry eye patient should be regarded as a separate individual with specific problems and requirements. The intention of this paper was not to formulate a fool-proof recipe for successful lens wear in all dry eye patients; the data were presented in an attempt to aid practitioners in identifying those patients having a greater chance for success despite a "dry eye". In addition, the information was supplied so that the contact lens practitioner could better choose a starting point when attempting to fit a dry eye patient. It is obvious that no one lens will solve every problem.

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Visual Performance Through the Aspheral Lens

G.C. Woo *
D. Otto **

Abstract

In this study, a comparison of visual performance through the central parts of the Aspheral and conventional ophthalmic lenses was made using visual acuity and contrast sensitivity as indices of performance. The results of our investigation indicate that the Aspheral lens with its unique lens design provides the same visual performance as other conventional lens designs.

Résumé

Cette étude présente une comparaison de la performance visuelle donnée par la lentille Asphéral avec celle des lentilles ophtalmiques conventionnelles, alors que l'acuité visuelle et la sensibilité au contraste sont utilisées comme indice de performance, et que la zone centrale des lentilles est étudiée. Les résultats de cette recherche montrent que la lentille Asphéral, avec les caractéristiques qui lui sont propres, fournit une performance visuelle identique à celle des lentilles de conception traditionnelle.

Introduction

Aspheral is a new aspheric lens manufactured by Essilor. It is designed for spectacle wearers with corrections between +6.00D and −6.00D. Unlike a high myope who is chiefly concerned about the edge thickness of the lens or a high hyperope who is chiefly concerned about the weight of the lens, an ametrope between +6.00D and −6.00D is concerned about both thickness and weight as well as curvature. Using a material with a refractive index of 1.604 and aspheric surfaces, the Aspheral lens has reduced curvature, thickness and weight[1]. In this study a comparison of visual performance between Aspheral and conventional ophthalmic lenses (crown, CR39 and Fit 40) was made using visual acuity and contrast sensitivity as indices of performance.

Thickness is an important cosmetic factor. Aspheral is thinner than ophthalmic crown either in the centre or the edge depending on the lens power because of its higher refractive index and its reduced curvature. A comparison between the thickness of Aspheral and crown lenses is shown in Figure 1. The weight of the ophthalmic lens is important to the comfort of the patient. The weight depends on both the density of the lens material and the thickness of the lens. Although the Aspheral has a slightly higher density than crown (Aspheral 2.6 g/cm^3; crown 2.53 g/cm^3), Aspheral is substantially thinner due to its decreased curvature and higher refractive index. Figure 2 gives the relative weights of Aspheral and crown lenses.

Reduction of curvature makes a lens more attractive. However, aberrations depending on curvature, known as the Von Seidel aberrations, include spherical aberration, coma, oblique astigmatism, curvature of field and distortion. These aberrations must be kept to a minimum. Effects due to spherical aberration and coma are insignificant because of the smallness of the stop at the centre of rotation of the eye[2]. The effects due to distortion are usually disregarded since distortion does not affect the sharpness of images but merely prevents an exact geometric reproduction of an object. The effects from oblique astigmatism and curvature of field, however, must be considered.

Oblique astigmatism occurs when there is oblique refraction at a spherical surface. Light which is refracted in the tangential section does not focus at the same point as light refracted in the sagittal section. Curvature of field occurs because not all points of a linear object are equidistant from a spherical surface of refraction. The resulting image is curved. In the design of conventional spherical spectacle lenses, either the oblique astigmatism or the curvature of field is corrected or a little of both. The curvature is used to decrease these aberrations. Graphical solutions in calculation of the required surface powers for different lens powers required to correct either oblique astigmatism or curvature of field are referred to as the Tschernig ellipses. Oblique astigmatism and curvature of field are generally higher in the periphery of ophthalmic lenses with spherical design. These aberrations affect the performance of foveal vision only when the eye rotates behind the lens. These aberrations have to be minimized by optical design for an ocular range of 30 degrees from the primary position of gaze.

Aspheric surfaces offer an extra parameter to reduce aberrations. Aspheric surfaces allow a less curved lens while still reducing oblique astigmatism or curvature of field. This design parameter also improves fit into modern frames, spectacle magnification and peripheral distortion[3]. As early as 1909, Gullstrand designed an aspheric lens with the aim of reducing oblique astigmatism for aphakes[4]. Renewed interest in aspheric lenses is due to the development of methods to produce aspheric lenses at a reasonable cost.

A possible disadvantage of the new material is an increase in reflections as a result of the high refractive index. Patients often find these reflections annoying. Such reflections can, however, be reduced with the use of antireflection coatings. The application of coatings increases the cost of the lens.

When considering the transmission of a lens, a desirable lens would have decreased transmission in the ultraviolet and infrared wavelengths since these wavelengths are potentially undesirable to the eye. On the other hand, maximum transmission in the visible range is desirable. The Aspheral lens has a good ultraviolet cutoff at 330 nm. CR39 has a higher ultraviolet cutoff and both CR39 and crown have

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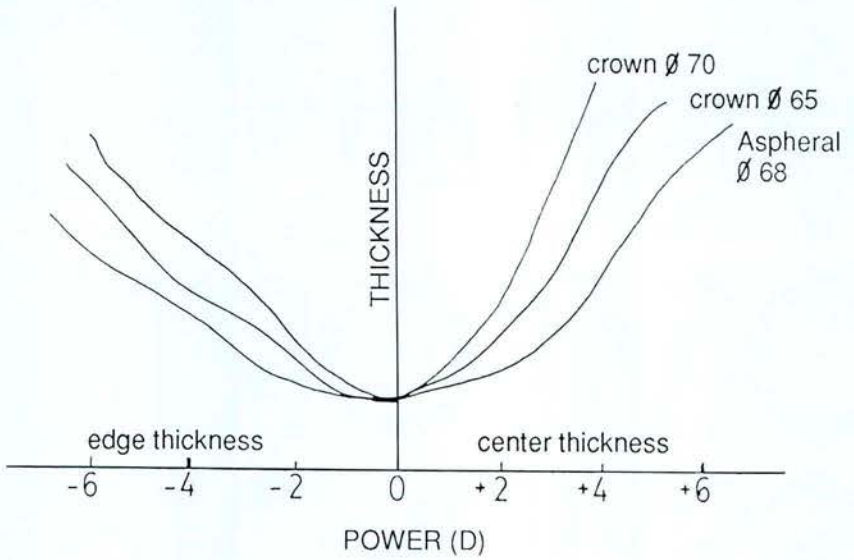

Figure 1
Relative thickness of Aspheral and conventional ophthalmic lenses with powers between −6.00D to +6.00D (from Essilor[1]).

more transmission in the visible range (See Fig. 3).

Because Aspheral is made from a glass material, Aspheral has a low impact resistance and is more difficult to tint. Tinting of glass lenses is more difficult because the tint must either be included in the glass mixture or applied in a thin vacuum coat. Plastic lenses are simply dipped into the desired dye. However, advantages of a glass material include scratch resistance and ease by which coatings are applied. Application of a coating, like an antireflection coating, to a plastic lens is more difficult owing to the porous nature of the material and the low temperature it can withstand.

To test the effectiveness of various lens designs, the modulation transfer function (MTF) may be used. MTF demonstrates how much contrast reduction the lens image loses at various spatial frequencies. MTF is defined by the following equation:

MTF=contrast of image/contrast of object

Measurement of MTF involves the use of a sine wave grating. The contrasts of the grating and the grating image are used to calculate MTF. Advantages of using a sine wave are: (1) it lends itself to mathematical analysis and evaluation more readily than a square wave, and (2) any deterioration of the sine wave target by an optical system results in a sine wave image of lower contrast. Decreases in MTF may be due to (1) dioptric errors in power, astigmatism and prismatic effect, (2) diffraction, or (3) defects due to surface and material imperfections[5].

Advantages of MTF are that it helps in the understanding of the effect of errors and not all aberrations are simple "focus" errors. Aperture errors, like spherical aberration and coma may exist which are not taken into account[5].

There have been few studies of visual performance with different lens designs. Atchison[3] stated that no one really knows if the differences in base curves between the current best form lens series are important to spectacle wearers in the performance of daily activities.

One way to measure visual performance is to measure visual acuity. Visual acuity, however, only measures the limit of resolution with the use of high contrast letters.

To obtain the equivalent measure of MTF on the human visual system a psychophysical technique known as contrast sensitivity function can be used[6]. Contrast sensitivity is emerging as an important tool for the assessment of visual performance.

> Thickness is an important cosmetic factor. Aspheral is thinner than ophthalmic crown either in the centre or the edge depending on the lens power because of its higher refractive index and its reduced curvature.

Experimental research has shown contrast sensitivity to be a more complete description of different types of vision loss. Knowledge of a patient's visual acuity may give little or no ability to predict the patient's contrast sensitivity[7].

Contrast sensitivity depends on an optical component (optical imperfections, diffraction and scatter) and a neural component (anatomical and physiological limitations). Since the contrast sensitivity function is an excellent indicator of visual performance, it is advantageous to use this function to analyse the quality of vision through these optical media designed to correct ametropia.

Optical aberrations have the largest effect at high spatial frequencies[8]. If the Aspheral corrects aberrations, especially oblique astigmatism, to the same degree as other lens designs, one would expect each subject to have the same contrast sensitivity for each lens design.

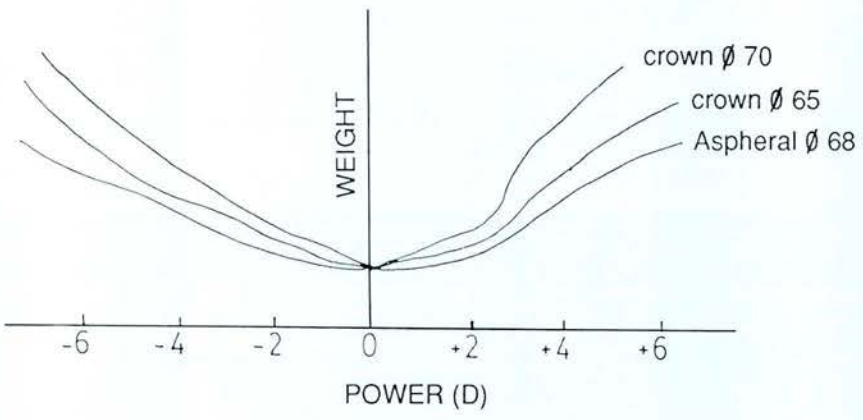

Figure 2
Relative weight of Aspheral and conventional ophthalmic lenses with powers between −6.00D to +6.00D (from Essilor[1]).

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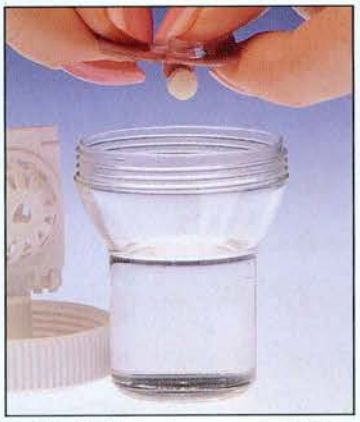
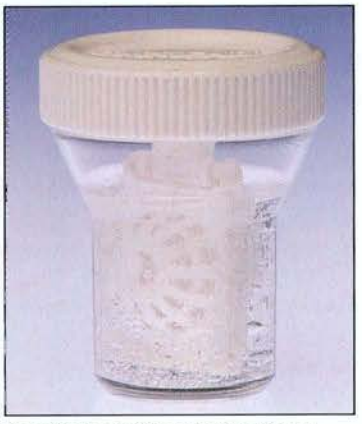
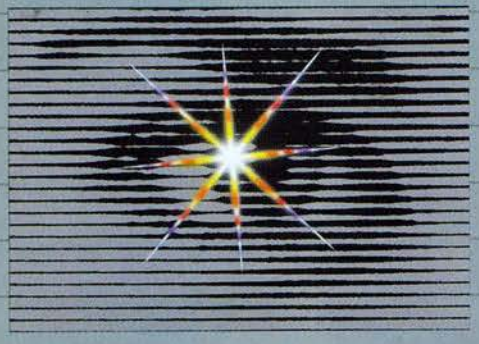


Disinfect (20 minutes or overnight). Drop OmniCare tablet into disinfectant solution.

Leave for 10 minutes or overnight



Peroxide is 100% neutralized into a gentle buffered isotonic saline solution. Lenses are ready to wear!



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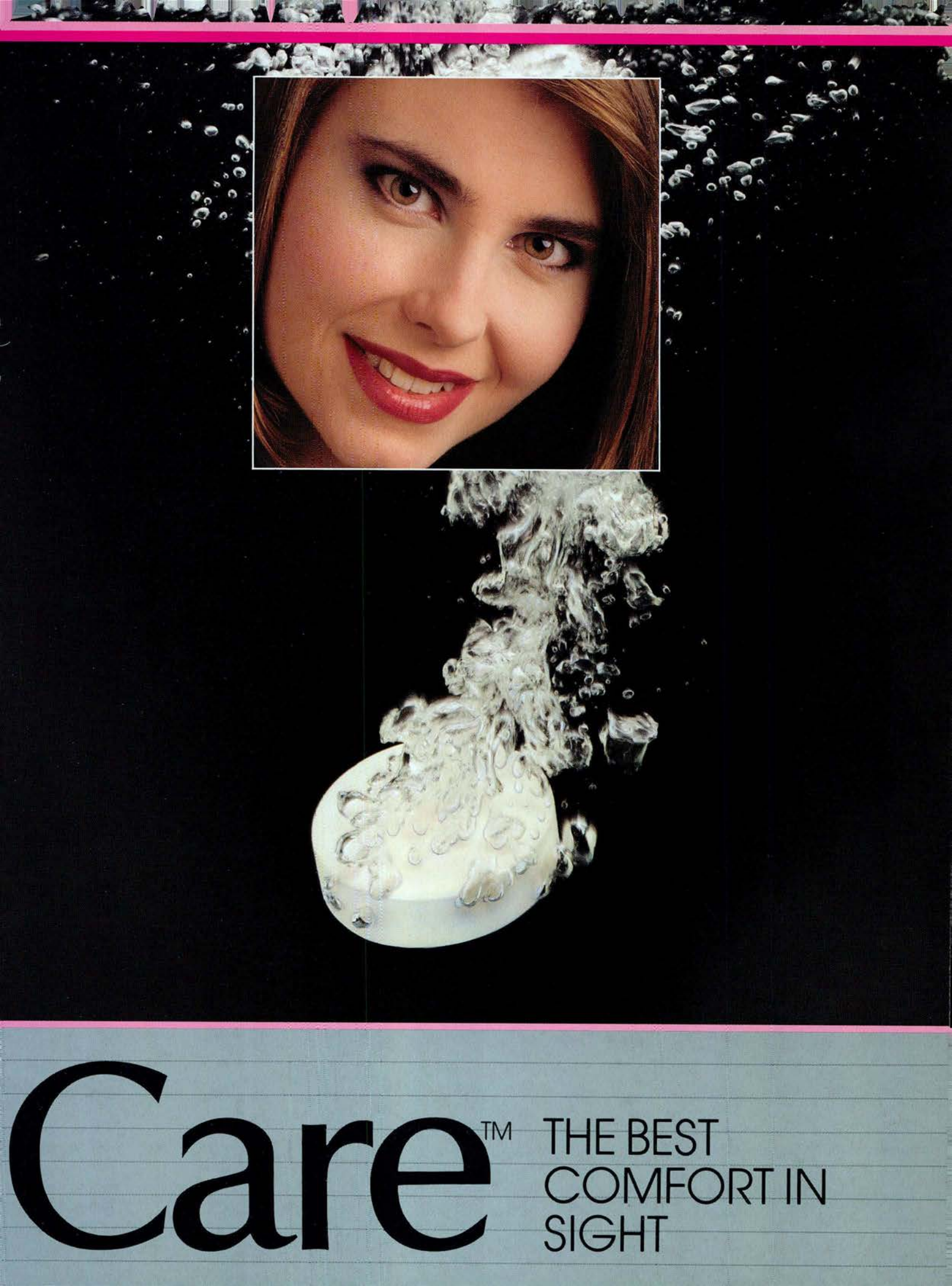
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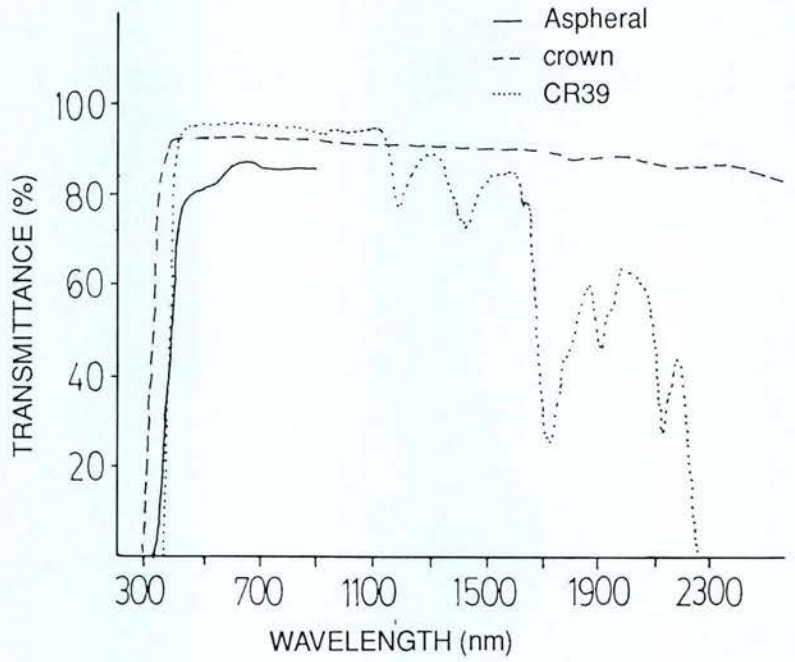

Figure 3
Typical transmission characteristics of the Aspheral lens along with crown and CR39 lenses (from Essilor[1]).

Method

A total of 20 eyes were tested. The subjects ranged in age from 22 to 45 years of age. Amounts of ametropia ranged from −6.00D to +0.50D. The various lens designs tested were the Aspheral and three conventional lenses: crown, CR39 and Fit 40. Distance visual acuities were measured with a high contrast University of Waterloo LogMAR chart that contained interaction bars to normalize for crowding at the ends of each line[9]. The subject was asked to read across the chart horizontally to find the smallest letter seen before reading vertically down a column of letters. Luminance of the chart was approximately 100 cd m–2.

Contrast thresholds were determined by using vertical sinusoidal gratings of a number of spatial frequencies. These gratings were generated on a Joyce screen and served as the stimulus. The gratings were presented to each subject of each stimulus testing condition and the method of two alternative forced choice with two interleafed staircases was used to elicit contrast thresholds. Each staircase consisted of 30 presentations. Each subject was positioned by means of a chin and forehead rest and was instructed to look at the red LED fixation point at the centre of the screen. On each trial, the stimulus appeared randomly on the left or right side of the screen and the subject responded by pressing the appropriate key. Contrast was varied by a switched attenuator. The angular subtense of the screen was 10° and the luminance of the screen was 100 cd m–2. The viewing distance was 131.4 cm. Its colour was white (P4 phosphor) and its frame frequency was 200 Hz. Contrast thresholds were determined at eight specific spatial frequencies (0.33, 0.65, 1.3, 2.6, 5.2, 10.4, 16.29 and 20.8 c deg–1). (Spatial frequencies were chosen to be representative of low, medium and high frequency regions.) These thresholds were then converted to contrast sensitivities. In addition to the laboratory method, the subjects are subjected to the Vision Contrast Test System (VCTS)[10].

> Aspheric surfaces offer an extra parameter to reduce aberrations. Aspheric surfaces allow a less curved lens while still reducing oblique astigmatism or curvature of field.

The VCTS test consists of a chart of 5 rows of 9 sinusoidal grating test patches. Each row consists of a different spatial frequency. The spatial frequencies are 1.5, 3.0, 6.0, 12.0 and 19.0 c deg–1. The contrast of the test patches decreases from left to right in steps of approximately 0.1 log units. The test gratings are oriented in one of 3 possible orientations: vertical, 15 degrees right or 15 degrees left. The subject was required to report the orientation of the grating in a forced choice technique. The lowest contrast patch that the subject could correctly identify was recorded. Each patch subtended 1.63 degrees at a distance of 3.05 m (10 ft.). The luminance of the patch was approximately 100 cd m–2.

Both the laboratory CSF and the VCTS clinical test were done on each eye for the four different lens designs. In order to determine the effect of screen size on contrast thresholds, two subjects underwent a second experiment with a smaller 5° field size made possible by masking the Joyce screen.

TABLE 1
Visual Acuity Scores of Five Subjects

Subject	Crown		CR 39		Fit 40		Aspheral	
	OD	OS	OD	OS	OD	OS	OD	OS
GW	$6/6^{-1}$	$6/6^{+1}$	$6/6^{-1}$	$6/6^{+1}$	$6/6^{-1}$	6/6	$6/6^{-1}$	$6/6^{+2}$
BI	$6/4^{-2}$	$6/4^{-3}$	6/4	$6/4^{-1}$	$6/4^{-1}$	6/4	6/4	$6/4^{-1}$
DO	6/5	6/5	6/5	6/5	6/5	$6/5^{-1}$	6/5	6/5
PE	$6/4^{-1}$	$6/4^{-1}$	$6/4^{-1}$	$6/4^{-1}$	$6/4^{-1}$	$6/4^{-1}$	$6/4^{-2}$	$6/4^{-2}$
EB	6/5	6/5	6/5	6/5	6/5	6/5	6/5	6/5

Results and Discussion

The measurement of distance visual acuity of 5 subjects (10 eyes) showed no significant variation among 4 different lens designs (see Table 1). This result is not surprising since visual acuity only measures the high contrast limit of resolution of the human visual system.

Averaged results for both the laboratory CSF test and the Vistech test of ten subjects are shown in Figures 4 and 5. Using the F test at 0.05 level no significant difference in contrast sensitivity with either CSF test was found among the different lens designs. The results suggest that there is no difference in visual performance with the different lens designs. However, there may be a subtle difference in contrast sensitivity which is either not detected by the various methods used or the patient is tolerant to these differences[10].

> There have been few studies of visual performance with different lens designs.

Contrast sensitivity function obtained with the laboratory method is quite different from the VCTS test. This is due to different stimulus conditions and different psychophysical techniques employed by the two methods.

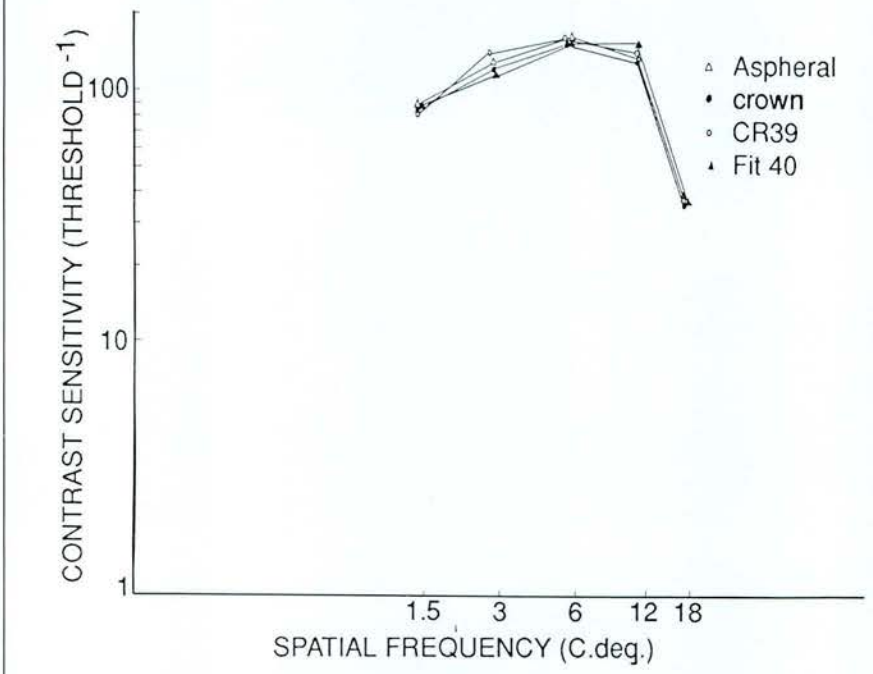

Figure 5
Mean contrast sensitivity functions obtained with 4 different ophthalmic lenses on 20 eyes using the Vistech test.

Another consideration is the area of the visual field being tested. The aberration which is considered the most in lens design is marginal astigmatism. Marginal astigmatism has a greater effect in the periphery than in the central field of vision. Therefore an additional experiment was carried out on two of the subjects to see if there was any difference in visual performance with the various lens designs using eccentric fixation. No difference between lens designs was revealed.

Shown in Figures 6 and 7 are the averaged CSF results of the two subjects who repeated the experiment with a 5° field size. One would expect the 10° field size to show a greater difference between the various lens designs since a larger field size permits more peripheral aberrations. No significant difference between lens designs was noted at either field size. The contrast sensitivity is higher in the low spatial frequency end of the curve. This effect is due to neural connections and has been explained by Hess and Howell[11].

> The aberration which is considered the most in lens design is marginal astigmatism.

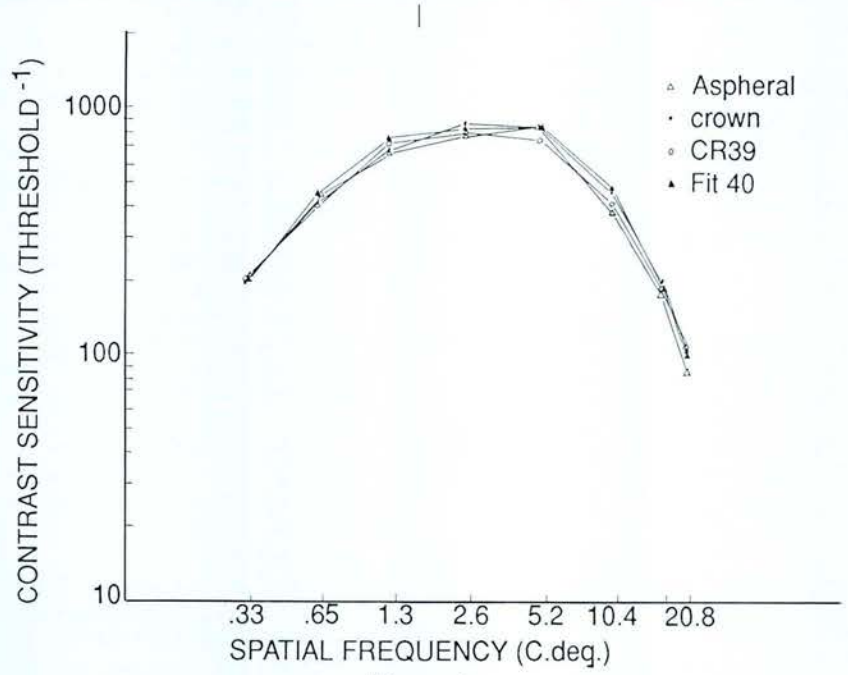

Figure 4
Mean contrast sensitivity functions obtained with 4 different ophthalmic lenses on 20 eyes using the laboratory method.

Summary

For ametropes between +6.00D and −6.00D the major factors to consider in lens design are curvature, thickness and weight[1,12]. The Aspheral is a lens which reduces all three of these factors. This makes the lens more attractive and com-

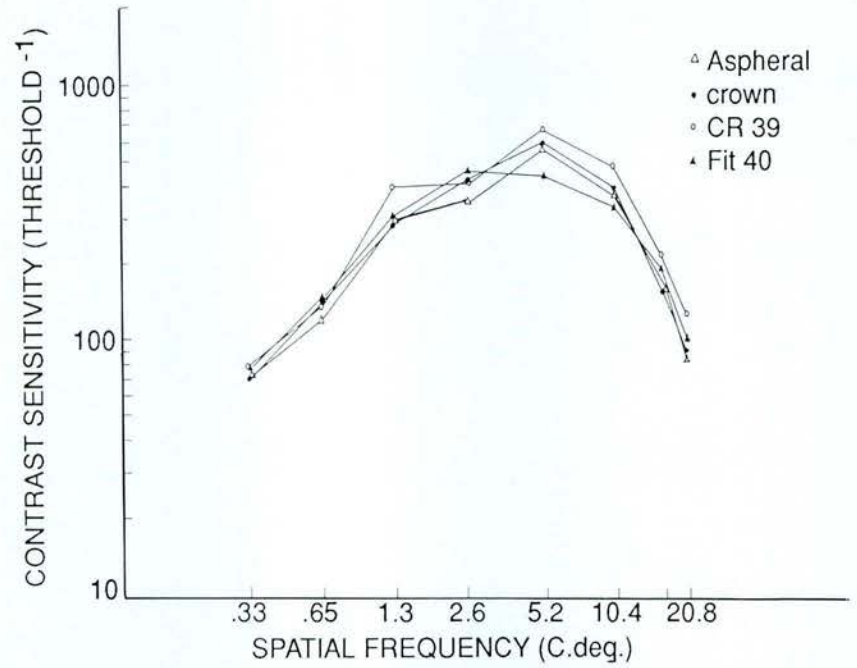

Figure 6

Mean contrast sensitivity functions obtained with 4 different ophthalmic lenses on 4 eyes with a reduced field size of 5 degrees using the laboratory method.

fortable. Disadvantages of the Aspheral include an increase in the number of reflections and a low impact resistance. However, the problem of reflections may be remedied with the application of an antireflection coat. Due to the low impact resistance, all patients receiving this lens should be advised that the lens is only a dress lens and should not be worn during any sporting activity. The results of this study indicate that the change in lens design does not compromise visual performance through the central area of the lens in any way. Therefore, the Aspheral is an attractive, comfortable dress lens which provides the same visual performance as other conventional spherical lens designs. It must be emphasized, however, that the similarity of the visual performance between this lens and others are only valid for the central area of the lenses. Visual performance through the periphery of the various lenses is yet to be determined.

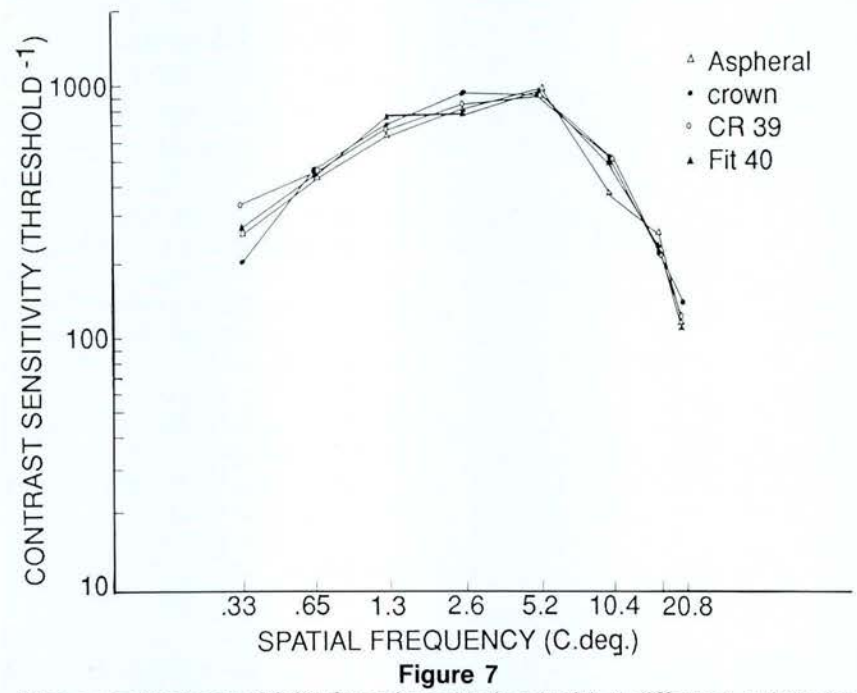

Figure 7

Mean contrast sensitivity function obtained with 4 different ophthalmic lenses on 4 eyes with a field size of 10 degrees using the laboratory method.

Acknowledgement

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Thimerosal Allergenicity

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Abstract

Current studies on a laboratory model of the allergenicity of thimerosal are reviewed. Studies were performed by immunizing rabbits to thimerosal following which specific antibodies were found in the sera and tears. The rabbits were challenged with perfilcon A hydrogel lenses coated with thimerosal bound to protein. Inflammatory responses similar to that found in sensitized patients were produced indicating that proteins conjugated with thimerosal can be both immunogenic and are capable of eliciting allergic responses.

Résumé

Les auteurs examinent les études actuelles d'un modèle de laboratoire sur l'allergénicité du thimerosal. Des études ont été effectuées par l'immunisation de lapins au thimerosal: on a retrouvé dans les sérums et les larmes des anticorps spécifiques. Les lapins ont subi un essai de provocation à l'aide de lentilles à hydrogel perfilcon A, enrobées de thimerosal lié à une protéine. Ils ont observé des réactions inflammatoires analogues à celles retrouvées chez les malades sensibilisés, ce qui montre que les protéines conjuguées au thimerosal peuvent être à la fois immunogènes et capables de provoquer des réactions allergiques.

Some adverse ocular inflammatory reactions appear to be of immunological origin. The conjunctivae of the eyes and associated tissues are associated with a rich complement of the mucosal associated immune system which normally produce secretory IgA in the lacrimal fluid.[3,5,17,18] Chronic antigenic stimulus during the allergy season or the chronic irritation of eyes with an immunogenic substance may provoke the production of not only IgA, but also IgG, IgE antibodies as well as cell mediated immune responses.[3,5,8,11,14,16] The most common acute antibody mediated responses involving IgE or IgG antibodies appears to be the immediate "red eye" response typical of vernal conjunctivitis which usually resolves within 24 to 48 hours.[1,8,11] In contrast, chronic cell-mediated inflammatory responses, some of which may be associated with the use of hydrogel contact lenses, including giant papillary conjunctivitis or keratoconjunctivitis can persist for weeks to months.[2,3,6,12-16,19] It would appear that a strong correlation exists between these ocular hypersensitivities and the use of various lens care preservatives. Organomercury preservatives have been additives in some pharmaceutical products including contact lens care solutions.[2,4,6,9,11,14,15,20-24]

Heavy metals such as mercury are biologically toxic and several authors have investigated the chemical and toxic properties of mercury and organomercury products such as thimerosal.[9] Mercury and methyl mercury are well known poisons with neurotoxic properties which have been identified as an industrial environmental contaminant in Japan and Canada.[9,23] The excessive clinical use of solutions containing thimerosal has even led to mercury poisoning in some pediatric patients.[23] The measurement of mercury levels by high performance liquid chromatography and atomic absorption spectrophotometry is now specific, accurate and reproducible. It has been established that the quantity of thimerosal present in lens care solutions is below toxic levels. Therefore, since the ocular hypersensitive responses in sensitive patients are specific for the lens care reagent at concentrations far below toxic levels, it would appear that chemical toxicity is not a significant factor in ocular hypersensitivity.[20,21] In addition, preservatives with molecular weights of less than 1000 are too small to be capable of inducing an immune response and it is necessary to attach them to larger protein carriers in order to stimulate the immune system. Recent studies have shown that saline solutions of thimerosal show accelerated decomposition into thiosalicylate and ethyl mercury which could react with ocular proteins.[25-27] As many lens care solutions also contain isotonic saline the conditions are opportune for the initiation of ocular hypersensitivity should the shelf-life of the products be ignored. However, it is unknown at this time which hapten could be responsible for ocular immunization and allergic reactions. Indeed, there appears to be a great need for considerable basic immunological research in this area.

The incidence of serious eye reactions varies from 10 to 25% of contact lens wearers.[2,11,15,19] As some of these reactions were due to the use of thimerosal, this preservative in many solutions was changed to reagents such as sorbate or chlorhexidine only to see further allergic reactions, apparently, to these preservatives.[25,26,28,29] For this reason, many lens care solutions are now free of preservatives. However, as the use of the two most potent bacteriocidal preservatives, thimerosal and chlorhexidine,[11,22] have been reduced, there has been a concomittent increase in the incidence of a variety of devastating ocular infections associated with contact lens usage.[11,22,30-40] The fact that bacteria readily adsorb to contact lenses and are not easily washed off appears to facilitate ocular infections.[31,34] Even though the protective mechanisms in the eye (eg. lysozyme) usually destroys bacterial pathogens the reaction of thimerosal with bacterial products adherent to the contact lens may provoke stronger immune responses. It is not unexpected that preservatives could also react with human tissue proteins as they exert their antibacterial effect through their reaction with microbial proteins. The surface of hard and soft lenses readily adsorb proteins, preservatives and lipids from tears and contaminated lens care products.[10,20,35-37] In addition, there have been reports of several cases of ocular allergies to the proteolytic enzyme papain, which is used in lens cleaning.[1,7]

We have shown that thimerosal reacts directly with proteins thus introducing a thiosalicylate or ethylmercury group which could act in part as a foreign hapten on autologous protein

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carriers.[20,21] Indeed thimerosal appears to react promptly with many proteins and can induce thimerosal specific antibodies in experimental animals and presumably patients. Immunochemicals preserved with thimerosal have been shown to become permanently conjugated with thimerosal derivatives.[24] Since some patients can produce both IgM and IgG antibodies to thimerosal, these antibodies will react with preserved serologicals resulting in false positive reactions in serological tests.[24] In erythrocyte cross-match reactions, the preserved serologicals reacted with anti-thimerosal antibodies from donors in the presence of complements to cause immune adherence and false positive agglutination reactions.[24] Some pharmaceutical products including vaccines are preserved with thimerosal, thus providing a source of inadvertent immunization to many patients receiving therapeutic or prophylactic immunization.[4,38] Therefore the subsequent *in vivo* use of thimerosal-preserved biologicals could cause serious hypersensitivity reactions mediated by immune complex formation and complement activation in immune patients. In addition, mercuric chloride has been shown to polyclonally stimulate IgE production in rats, providing yet another allergy promoting factor to be considered.[39] If the local conjunctival lymphoid system responded to derivatized proteins, then local inflammatory reactions would be the expected result. As many as 82% of thimerosal users with severe ocular inflammatory reactions do show both immediate and delayed type hypersensitivity to dermal challenge inoculations or patch tests of thimerosal.[14] However, due to the poor reproducibility of intradermal skin or patch tests or the unavailability of serological tests, a comprehensive evaluation of these responses in the general population has not been performed.[6,11,14,15]

> The excessive clinical use of solutions containing thimerosal has even led to mercury poisoning in some pediatric patients.[23]

Quantitation of total serum and lacrimal immunoglobulins has revealed little of a specific nature other than an expected increase in tear volume and total protein output during ocular inflammation.[3,5,17] Normal tears contain about 70 μg/ml IgA and little or no IgG and no IgE. In patients with giant papillary conjunctivitis, IgA increased to 170 μg/ml and IgG to 50.7 μg/ml. More importantly, IgE levels increased from undetectable to 6.9 IU/ml.[3] Therefore, it would appear clear that the ocular reaction is associated with immunoglobulin production. To what extent this is due to local mucosal production or the exudation of systemic plasma proteins is unknown. Only a portion of these tear antibodies may be specific for lens care products. The specificity of the inflammatory response is often demonstrated by placing the offending solution as a challenge test directly in the eye. This approach is often painful or even hazardous to the patient and a simple reliable qualitative assay is needed for patient assessment.

We were successful in chemically and spontaneously reacting thimerosal with many protein carriers.[20,21] The products contained mercury as detected by atomic absorption spectroscopy indicating that the whole thimerosal molecule and/or the ethyl mercury group were capable of binding to protein. Tests to determine whether the thiosalicylate derivatives are also bound to the proteins remain to be performed. Enzyme linked immunoassays (ELISA) were used to quantify the specific immune response to thimerosal induced in rabbits by immunization with conjugated antigens in Fruends' adjuvant. Specific antibodies to thimerosal derived epitopes were seen in the serum of all the immunized rabbits. In addition, specific antibodies were also detectable in the rabbit tears. Subsequently, these antibodies were used to detect thimerosal derivatives on chemically and spontaneously coupled carrier proteins and on new lenses incubated with the antigens. Most carrier proteins chemically coupled with thimerosal cross-reacted with anti-thimerosal antibodies but very few, if any, of the spontaneously coupled carriers cross-reacted significantly. This unusual and unexpected finding is being pursued in order to further define epitope specificity. Chlorhexidine was recently studied as a second allergenic epitope and a similar study is underway in order to validate the observations made on thimerosal. This choice is appropriate since the increasing use of gas permeable rigid contact lenses has led to the increased use of chlorhexidine preserved lens care solutions. Preliminary evaluation of a miniature ELISA assay has shown that it is appropriate for patient evaluation as both systemic (serum) and local (tear) immunoglobulin responses are easily and inexpensively detected. Not only is the proposed detection of the local humoral response in tears more relevant to ocular hypersensitivity but the nature of our test antigens are also more appropriate for the detection of thimerosal specific responses. The thimerosal derivatized antigens were also used in the immune rabbits for intradermal skin tests and for ocular challenge tests using contact lenses previously incubated with the antigens. It was noted that unused perfilcon A contact lenses absorbed up to 3 μg of protein which appeared to be very firmly bound.[20] Nevertheless, these antigen sensitized lenses caused severe ocular inflammatory responses in most of the immunized rabbits but in none of the normal unimmunized rabbits[21] The severity of the response correlated with the titer of specific antibodies in the serum. It was also noted that the introduction of these antigens into the eye of the normal rabbits using a daily wear (8 hour) regimen did not result in the induction of a detectable primary immune response. This indicated that several (50 to 10) exposures to levels of antigen similar to that contained in lens care solutions (0.001%), was not capable of eliciting an immune response to these relatively weak antigens. Chronic exposure for weeks or months, possibly coupled with traumatic stimuli by physical injury or infection, may be responsible for human sensitization.

> Chlorhexidine was recently studied as a second allergenic epitope and a similar study is underway in order to validate the observations made on thimerosal.

Evidence is accumulating to implicate lens care preservatives which can react with proteins in the induction and elicitation of specific ocular inflammatory responses. Lens care preservatives which can react with proteins such as thimerosal, chlorhexidine and sorbic acid are probably more likely to elicit these responses than simple disinfectants such as hydrogen peroxide, hypochlorite or heat. The specificity of the response to thimerosal and the demonstration of the presence of specific antibodies in serum and tears of rabbits in our experimental model confirms the immunological nature of this reaction. Therefore, to minimize the incidence of ocular allergy, additional means for patient evaluation are needed to allow the

optometrist to identify both the sensitive patient and the relevant allergen so that appropriate lens care procedures can be selected. A diagnostic tear antibody test is being developed to allow the identification of the specific allergens, thereby permitting the selection of an appropriate lens care system for the sensitive patient.

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Whistling Face Syndrome

H.A. Backman *

The Whistling Face Syndrome, also known as the Freeman-Sheldon Syndrome or Cranio-tarsal dystrophy, was first described by Freeman-Sheldon in 1938.[1] There have been approximately 30 cases reported in the literature. Two patients have been seen in the Ophthalmology department, Montreal Childrens Hospital, McGill University. The first infant died of aspiration.

Major manifestations of the syndrome are:

1. Small mouth and tongue with protruding lips and long upper lip.
2. Receding chin with a mound of subcutaneous tissue inferior to the lower lip demarcated by a vertical furrow on either side.
3. Small, narrow nose and nostrils, full cheeks, high arched palate, flattening of the facial bones.
4. Deep set eyes with ocular hypertelorism.
5. Ulnar deviation of the hands without bony abnormalities.
6. Bilateral equinovarus (club foot), thickening of the skin and subcutaneous tissues over the flexure surface of the first phalanx of the fingers, finger contractures and dimples of the flexure surface of the hands.
7. Spina bifida, thoracic scoliosis, and a short broad neck.

Mental retardation is absent.

Most reported cases are sporadic, but dominant pedigrees are known. The father-to-son transmission precludes sex-linkage. The male infant patient was born one month prior to examination. The gestation period was 38 weeks, birth weight 2250 gms. and the Apgar score 7/8.

The mother was 27 years of age, had consumed excessive amounts of alcohol and had a hand anomaly and hemifacial paresis. There was no fetal alcohol syndrome. The mother was the youngest of 15 children and the only one with dysmorphic features (new mutation). She could not eat until age 4 years when she had surgery to open her mouth.

The infant was severely dysmorphic with the following features:

> This case demonstrates that a simple procedure may overcome a blepharospasm and permit an ocular and visual examination.

1. Abnormal skull configuration. Redundant skin on the forehead.
2. The following facial features:
   Prominent nasal ridge. Very thin philtrum.
   Thin lips.
   Prominent maxillary bone.
   Recessed mandible.
   Small mouth. High arched palate.
   H-shaped cutaneous dimpling on the chin. Short neck.
   Redundant cervical skin and arthrogyrosis of both upper and lower limbs as well as the mouth.
3. Microphthalmos. Small palpebral fissures which could not be opened manually. Deep set eyes.

Since it was difficult to open the eyes and there was concern about visual deprivation, an ophthalmology consultation was requested. Two muscle hooks without the possibility of leverage failed to open the eyelids. The obicularis muscles worked very well and if the lids could not be opened an ultrasound examination of the orbit was considered. Botulinum toxin was also considered to assist in overcoming the blepharospasm as well as a lateral canthotomy (frontalis sling or fascia lata sling). It was decided to block the VII Nerve with epinephrine and xylocaine. The eyes opened and the examination revealed no ocular abnormalities nor visual deprivation. It was later observed that the eyes did open spontaneously for brief periods of time permitting visual stimulation.

The autosomal dominant condition is less severe and lethal than the recessive condition. According to the consulting geneticist there is a 50% chance of recurrence in the offspring. The prognosis was that the general health of the child would be normal. The child would be neurologically and visually normal but may require orthopedic surgery.

This case demonstrates that a simple procedure may overcome a blepharospasm and permit an ocular and visual examination. Brief eye opening may be sufficient to provide visual stimulation and to prevent visual deprivation.

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Canadian Optometry Students in Hong Kong

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Introduction

After extensive planning by Dr. George Woo, a professor at the University of Waterloo, School of Optometry and currently Head of the Department of Diagnostic Sciences at the Hong Kong Polytechnic, a programme was arranged where three third year optometry students from Canada could fulfill their summer clinic credit requirements at various eye care facilities in Hong Kong. Two weeks were spent by the students at each of the following locations: the Low Vision and General Eye Clinic (LVGEC) at the Hong Kong Society for the Blind (HKSB); the private practice of Woo, Tong and Partners; the Eye Unit at the Li Ka Shing Specialist Clinic at the Prince of Wales Hospital in Shatin; and the Eye Clinic at the Yaumatei Jockey Club Polyclinic. Saturdays during the eight-week programme were spent at the Hong Kong Polytechnic Optometry Clinic. Services provided by these five clinics reflect the wide scope of eye care currently available to the public.

> Providers of eye care in Hong Kong include ophthalmologists, optometrists, orthoptists, dispensing opticians, refractionists, optical technicians, spectacle shop owners and others.

Providers of eye care in Hong Kong include ophthalmologists, optometrists, orthoptists, dispensing opticians, refractionists, optical technicians, spectacle shop owners and others. Only ophthalmologists are licensed as physicians. Currently, there is no legislation governing the practice of optometry in Hong Kong. There is also no health insurance for eye examinations and, in fact, there is no coverage for health care of any type. Instead, health care services are provided on either a public or private basis. Public facilities are funded by the government and, therefore, services can be provided for relatively low examination or consultation fees. Patients, for example, are only charged HK$23 ($4. Cdn) for an eye examination at a government funded eye care clinic. On the other hand, private health care practices can charge as much as the patients are willing to pay. The consultation fee for a general practitioner ranges from HK$60 to HK$80 while the fee for a specialist, such as an ophthalmologist in private practice, is about HK$180. Not surprisingly, government funded clinics and hospitals are much busier with appointments fully booked months in advance. However, there are always those who do not want to wait and can afford to pay for immediate attention.

*Student, O.D. programme, School of Optometry, University of Waterloo, Waterloo, Ontario

The split in services available to the rich and those available to the poor is evident in the field of eye care. Of the clinics visited by the Canadian students, the ones at the Prince of Wales Hospital, Yaumatei Polyclinic, and Hong Kong Polytechnic are government funded. Woo, Tong and Partners is perhaps the busiest and most renowned private ophthalmological practice in Hong Kong. The clinic at HKSB is sponsored by charity organizations and is partially funded by donations from the private sector. Following are some of the observations made by the three Canadian students during their rotation through these five eye care clinics.

Hong Kong Polytechnic

The Polytechnic is the only one of the five post-secondary institutions in Hong Kong offering a professional diploma programme in Optometry. The section of Optometry is operated under the Department of Diagnostic Sciences. Each year, only forty applicants are accepted from among many qualified Hong Kong students into this three-year professional diploma programme. The minimum entrance requirement is 3 "A level" subjects of good standing with a complement of several "O level" subjects. The requirement, therefore, is comparable to the Optometry programme in the U.K. The first two years of this programme concentrates on educating the students about optometric theories and skills while the last year emphasizes the clinical application of these theories and skills. During the final year, the students, under supervision, examine patients in the clinic during the school term which runs from October to June of each year.

Most of these professional diploma graduates are hired by optical stores where they are mainly restricted to performing refractions and are required to work excessively long hours. In Hong Kong, optical stores provide free refraction services to their customers. Presently, there is little opportunity for these optometric graduates to fulfill their role as primary care practitioners or to practise at their level of education.

> The split in services available to the rich and those available to the poor is evident in the field of eye care.

The general Optometry clinic is situated in the basement of one of the many brown brick buildings on the Hong Kong Polytechnic campus. A new complex with a modern Optometry clinic is presently under construction. At present, the general clinic has nine examination cubicles while the contact lens and visual training

clinic has eight examination rooms. Each examination cubicle contains a trial lens set, a phoropter, a back-lit visual acuity chart and hand held tests for colour vision and binocular vision. Retinoscopes, ophthalmoscopes and other diagnostic equipment are provided by the clinic. Students are not required to buy their own. The slit lamp, keratometer, NCT and perimeter are all located in one room, where the students share their use.

On Saturday mornings, each of the three Canadian students conducts an oculo-assessment on patients under the supervision of Dr. George Woo. Examination procedures include objective and subjective refraction, binocular vision assessment, slit-lamp biomicroscopy, direct ophthalmoscopy and intraocular pressure assessment using NCT. The majority of the patients examined are young adults or adolescents. In this age group, most have compound myopic astigmatism with a relatively high cylindrical component ranging from −1.00 dioptre to −4.00 D. cylinder. Some are also contact lens wearers and a progress check is included as part of the routine examination. Dr. Woo also examines low vision patients during these Saturday sessions and provides the three students with opportunities to examine these patients whenever possible. Low vision patients range from the middle aged to the elderly. Families with myopic degeneration and Stargardt's disease were examined. In an academic atmosphere, the Polytechnic clinic has provided the three students with training that closely approximates the University of Waterloo clinic.

Hong Kong Society for the Blind (HKSB)

Situated in a low income area of Kowloon at Sham Shui Po is the new building donated to Hong Kong Society for the Blind (HKSB) by the Royal Hong Kong Jockey Club. With the building, the upper levels provide accommodations, social services and therapy training for the visually handicapped, while the Low Vision and General Eye Clinic (LVGEC) on the first floor provide eye examinations for the general public. During their rotation at HKSB, the Canadian students remained in the LVGEC clinic where they observed and assisted the optometrists. There are two optometrists and one ophthalmologist at the clinic. One optometrist holds a Bachelor of Optometry from Australia while the other holds a Professional Diploma in Optometry from Hong Kong Polytechnic. Support staff include two receptionists and one nurse. All three

> There is little opportunity for these optometric graduates to fulfill their role as primary care practitioners or to practise at their level of education.

are responsible for taking the case history and visual acuity using the illiterate E chart prior to examination by an optometrist and/or an ophthalmologist. In addition, the nurse also tests visual fields using either the Goldmann Perimeter or the new Dicon Automated Field Analyzer.

The two optometrists prescribe and dispense low vision aids, assign and monitor amblyopia therapy, test and diagnose visual abnormalities and, most time consuming of all, educate the patient, or the parents of the patient, about the patient's diagnosis and prognosis. The optometrists' offices store a wide selection of low vision aids, ranging from stand magnifiers to a closed circuit television system (CCTV). Approximately ten per cent of the patients are examined behind a biomicroscope and about twenty-five per cent receive an internal examination with a direct monocular ophthalmoscope.

Each examination consists basically of loose lens retinoscopy followed by a trial frame subjective. Binocular status is assessed as pass or fail using the cover test plus either the Red/Green test or the Randot test. For young patients, colour vision is assessed via the Ishihara test. Intraocular pressures are rarely taken, although they are estimated by palpitation. Unusual cases or ocular pathologies are sent to the ophthalmologist's office next to the two optometrists' examination rooms. Along with these same day referrals from the optometrists, the ophthalmologist (one of the four who rotate through the clinic) has a long list of patients of his own scheduled. At this clinic, there is minimal patient case analysis between optometrists and ophthalmologists.

> The Department of Education in Hong Kong has a vision screening programme performed by health nurses at the various elementary schools.

On an average day, each optometrist will see 15 to 20 patients, most of whom are school children. The Department of Education in Hong Kong has a vision screening programme performed by health nurses at the various elementary schools. Children with visual acuity less than 6/24 (20/80) in either eye are required to seek an eye care practitioner for an eye examination. In cases where the child does not have a family ophthalmologist, they are referred to organizations such as the LVGEC at HKSB. Of interest is the fact that most of these school children became myopic with a cylinder component before the young age of six years.

A practice encountered at the LVGEC, as well as at other clinics in Hong Kong, is the reduction of minus sphere from the objective and subjective refraction in the final prescription given to the patient. This is particularly the case with low myopes who are to become first time spectacle wearers. The justification for this practice is that the full prescription will render an image that is too sharp and clear, resulting in symptoms such as dizziness and headaches. The patient is told that the prescription is less than the refractive error findings and a re-examination is required in six months to one year, at which time the full correction will be considered.

At LVGEC, the major low vision clinic in Hong Kong, approximately six to eight low vision patients are seen per week. A low vision examination usually involves a refraction and determination of visual acuity. Ocular health has been assessed by an ophthalmologist before the low vision assessment. In addition, some diagnostic procedures are performed based upon the ocular status of the patient. Counselling includes instructions regarding the use of low vision aids and reassurance. These patients require a lot of time and patience from the examiner, which the optometrists can offer at HKSB. Even for regular patients, the examinations are performed in a relaxed manner without time constraints. There is constant communication between the optometrist and the patient, or the patient's parents, which permits the examiner to evaluate the patient behaviourally as well. Without a doubt, counselling and patient-examiner communication are key ingredients in an examination at HKSB.

Woo, Tong and Partners

Consistent with the traditional laissez-faire attitude of the Hong Kong Government, there are no regulations governing the amount of money a private physician may charge for an examination. At

Woo, Tong and Partners, the fee is HK$180 which includes consultation with an ophthalmologist and an optometrist, and dispensing of drugs if necessary. Unlike ophthalmologists in North America, those in Hong Kong are legally permitted to dispense drugs and hire assistants with no qualifications in the ophthalmic or medical field.

Each of the two offices owned by Woo, Tong and Partners, one in Kowloon and one in Hong Kong, has its own staff of one optometrist plus a number of assistants trained by the ophthalmologists. The offices are well-supplied with various up-to-date equipment and instruments, including a YAG and Argon laser and a fundus camera for fluorescein angiography. At the Kowloon office, where the Canadian students stayed, there are seven assistants trained to dispense and fit spectacles, dispense pharmaceuticals, assist with minor surgeries, photograph fundi during fluorescein angiography and take case histories and visual acuities. The optometrist working at this office is a graduate from Australia and examines all contact lens patients, cataractous patients prior to and following surgery and any patient with vision complaints. Each patient assigned for an examination, except contact lens patients, automatically receives a loose lens refraction, a biomicroscopic and internal fundus evaluation. For those requiring cataract surgery, K-readings are taken also. Contact lens patients are evaluated by biomicroscopy and a refraction will be performed if needed. All contact lens fittings are done by the optometrist, but instructions regarding use of solutions and handling of contact lenses are taught by the assistants. The final prescription and any diagnosis written on file by the optometrist will eventually be determined by the ophthalmologist, leaving little counselling for the optometrist to do.

As with other private practices, the senior ophthalmologist at Woo, Tong and Partners has an enormous patient load and time must be utilized efficiently. Each ophthalmologist has access to two examination rooms connected by a door, which saves time required to sit and prepare a patient. The examination consists of a biomicroscopic evaluation and a fundus examination with a direct monocular ophthalmoscope. When necessary, the ophthalmologist will perform a dilated fundus examination using a binocular indirect ophthalmoscope, a quick refraction to verify the prescription, Goldmann tonometry to measure intraocular pressures and gonioscopy using a Goldmann gonioscope. Occasionally, the ophthalmologist will leave the examination rooms in between patients to perform minor operations and laser surgery in the treatment rooms. Minor operations such as pterygium removal, chalazion incision and curettage, and removal of ectropian surgery sutures are all done in-house under local anesthetic. All minor operations and laser surgeries are done on an out-patient basis, whereas major operations such as extracapsular cataract extraction (ECE) with IOL implant, dacryocystorhinostomy or strabismus surgery are performed at a private hospital (Baptist Hospital in Kowloon) which requires the patients to be hospitalized for approximately two days.

> A practice encountered at the LVGEC, as well as at other clinics in Hong Kong, is the reduction of minus sphere from the objective and subjective refraction in the final prescription given to the patient.

On a busy day, as many as one hundred patients will go through the Kowloon office, 50% of which will be seen by the optometrist.

The Bettmann Archive.

The patients come from all age groups, but seniors are seen more frequently. The majority of problems presented within the middle age groups are vague complaints such as red, itchy, gritty, painful and tired eyes. With the older patients, more glaucoma, diabetic retinopathy and cataracts are encountered. Young adults and adolescents usually come for contact lens fittings or a refraction assessment and spectacle therapy. In general, for a simple case, the ophthalmologist will spend approximately five minutes with the patient whereas the optometrist will spend ten minutes.

In Hong Kong, Woo, Tong and Partners is probably the only eye care center where optometrists work effectively with ophthalmologists. However, this is not as ideal as it seems because

> Counselling and patient-examiner communication are key ingredients in an examination at HKSB.

optometrists are actually restrained from employing all their abilities. An optometrists's skills are not restricted to refraction and contact lens fitting alone, but also include binocular vision assessment and training, detecting and prescribing treatment for amblyopia, dispensing low vision aids, as well as performing electrodiagnostic services. Unfortunately, with the government's refusal to accept Optometry as a primary health care profession, an optometrist in Hong Kong will be considered lucky if he or she finds a job refracting in an optical store.

Prince of Wales Hospital

Shatin's Prince of Wales Hospital is a modern, well-known teaching hospital in Hong Kong and the Li Ka Shing Specialist Clinic is situated in a prominent wing of this newly built establishment. Despite its remote location in Hong Kong, patients from all over the city and its neighbouring vicinities come for eye care. The ophthalmological department is headed by Dr. Patrick Ho, a retinal surgeon trained in the U.S. Working under him are two ophthalmologists-in-training. Both are graduates of the Hong Kong Chinese University Medical School.

The Specialist Eye Clinic is open on Mondays, Wednesday afternoons, Thursdays and Saturday mornings. During the rest of the working week, ophthalmologists spend their time in one of the ten operation theatres in the hospital. At the clinic is a supporting staff of sixteen nurses. Automated perimetry, visual acuity, fundus photography, fluroscein angiography, A scans, K readings, intraocular pressures using NCT and automated refractions are all performed by these nurses. There is also a health nurse whose sole job is to educate and counsel the patients about their ocular pathology; and if an operation is required, the surgical procedure that they must undergo, when they must check into the hospital and what possible benefits or implications may be expected.

The reception area at the eye unit, like most out-patient departments in the hospital, has lines of patients waiting to register long before functioning hours. Here appointments are made for a certain date without any time specifications, thus patients are seen on a first-come, first-served basis. At 9:30 in the morning, the nurses prepare these patients by taking visual acuity, intraocular pressure by NCT, case history and, sometimes, assess refractive error using a Humphrey Autorefractor. All the patients will have their eyes dilated unless there are contraindications. During an average morning session from 10:30 a.m. till 1:00 p.m., a single ophthalmologist, with the help of two nurses, will examine about forty patients. A similar number of patients will be seen in the afternoon session. The ophthalmologist will routinely perform a slit-lamp examination and binocular indirect ophthalmoscopy on all patients. Occasionally, Goldmann tonometry is used to determine a more accurate intraocular pressure reading. On children, a cover test and ocular motility test will be performed to assess binocular status and oculomotor dysfunction.

As is the case at other clinics, the patients at Shatin Specialist Eye Clinic are from all age groups, although the majority are adults and seniors. Most of the patients are being monitored for the progression of conditions such as diabetic retinopathy, glaucoma or senile cataract. A high percentage of patients have advanced ocular pathological problems. Other patients are referred by general practitioners or other ophthalmologists or are sent from other departments within the Prince of Wales Hospital.

The ophthalmological team of this unit is noted for its impeccable skills. Many unsuccessful retinal post surgical patients, even from as far away as Macau and Malaysia, are referred to this team. Under the direction of Dr. Patrick Ho, complicated retinal surgery, such as one consisting of a sclerotomy, closed vitrectomy, diathermy, gas/fluid exchange and endolaser is performed. Other operations include cyclocryotherapy, trabeculectomy, penetrating keratoplasty, extracapsular cataract extraction with intraocular lens implant and laser photocoagulation. Almost all patients undergoing cataract extraction at Shatin receive an intraocular implant as they are eligible for social funding which covers the cost of the lens.

As mentioned previously, the Prince of Wales Hospital is subsidized by the Hong Kong Government so that consultation fees are only HK$23. This fee is low and, at first impression, it seems to be a great benefit for the low income patients. However, after seeing the long waiting list for certain medical procedures, it is evident that the lower cost of medical attention does not necessarily equate to an availability of these services to the patient. For private clinics, where the fee for laser operations ranges from HK$1,000 to HK$2,000, the patient can usually receive treatment within the same week. At the Prince of Wales Hospital, however, a patient with proliferative diabetic retinopathy who needs panretinal photocoagulation must go on a waiting list for over three months. The poorly educated, low income patients do not seem to mind the wait because the laser operation will only cost them the same amount as a regular $23 consultation.

> In Hong Kong, Woo, Tong and Partners is probably the only eye care center where optometrists work effectively with ophthalmologists.

Although this eye clinic is well funded, it does not employ any optometrists, orthoptists or dispensing opticians. Patients with good ocular health whose chief complaint, for example, is blurred vision, are given artificial tears and are counselled to go elsewhere.

Yaumatei Jockey Club Polyclinic

The eye clinic occupies two floors of the Yaumatei Jockey Club Polyclinic. It is the biggest and the busiest eye care center in Hong Kong employing about thirty ophthalmologists (including ophthalmologists-in-training), five orthoptists, five optical technicians, but no optometrists. Considering the old equipment, the limited space available and the tremendous number of patients,

it is surprising how efficiently the clinic is operated. Rooms at Yaumatei are designated according to the specific eye care services provided within.

The casualty room is used to examine referrals from health care practitioners throughout Hong Kong. As many as 150 patients will go through this room in one morning session. Mondays are even busier because of the weekend casualties. A single desk, one biomicroscope, and one binocular indirect ophthalmoscope are shared by the two ophthalmologists working in the casualty room. A nurse is assigned to assist the two ophthalmologists. After a quick screening, many of the referrals are considerd non-urgent and, consequently, are directed to the reception area where an appointment is made for some six months later. Patients with severe problems requiring immediate attention are first sent to another room, where visual acuities are taken, before returning for the examinations. The most common cases presenting at the casualty room are labour related or industrial accidents such as corneal foreign bodies and chemical burns. In Hong Kong, blue collar workers are poorly educated and, to make matters worse, safety standards at construction sites are seldom enforced. The fines for breaking these regulations are minimal compared to the potential bonuses for finishing a job ahead of schedule. An estimated 90% of the corneal foreign bodies and chemical burns seen in the casualty room may have been prevented if proper safety goggles had been worn. There are no consultation fees if an eye injury is sustained during work and the patient usually gets four days of paid sick leave.

> With the government's refusal to accept Optometry as a primary health care profession, an optometrist in Hong Kong will be considered lucky if he or she finds a job refracting in an optical store.

There are two treatment rooms at the Yaumatei eye clinic. The most common treatments implemented by ophthalmologists are removal of corneal foreign bodies, electrolysis for trichiasis and incision and curettage of chalazions. No local anesthetic is used for chalazion operations because lid swelling may hide the nodule, making it difficult for an accurate incision. Also in the treatment rooms, nurses measure blood pressure, do Goldmann and automated perimetry, change dressings, measure intraocular pressure using Schiotz tonometry, and check the patency of the lacrimal drainage system.

The clinic has a surgery room which is only equipped for operations under local anesthetic. Operations witnessed by the Canadian students in this room included removal of pterygium, trabeculectomy, adjustable suture strabismus surgery, peripheral iridectomy, enucleation, ptosis retraction, cyclocryotherapy, and of course, cataract extractions. Unlike other clinics, more intracapsular cataract extractions are performed at Yaumatei than extracapsular cataract extractions with IOL implants. Money is usually the reason. A cataract extraction costs the patient HK$23, the same as a regular consultation fee with the ophthalmologist. If the patient wishes to have an IOL implant, he is charged HK$1,200 to HK$2,000, the material cost of an American made IOL. Ophthalmologists at Yaumatei also perform surgery under local or general anesthetic in the operation theatres at various government funded hospitals in the Hong Kong area.

At the teaching room, patients with unusual prediagnosed pathologies are brought in on a regular basis for monitoring. Each year,

two to four new medical doctors are accepted at Yaumatei to begin the four years of training and studying for the ophthalmology examinations in London, England. The teaching room gives these trainees the opportunity to examine some of the rarer ocular conditions. Optometry students from the Polytechnic also utilize the teaching room since the ophthalmologist in charge of teaching at Yaumatei is also one of the ocular pathology lecturers at Polytechnic.

Rooms are also allocated for para-professionals such as orthoptists and optical technicians at Yaumatei. British and Australian trained orthoptists perform duties such as prism neutralization of squints using the Krimsky Method, prescription of occlusion therapy, assessment of fusion using a Clement Clarke Synoptphore and measurement of ocular deviations using a Hess screen. Patients are usually examined by orthoptists prior to and following strabismus surgery. Optical technicians take visual acuities and do refractions at the clinic.

> The casualty room is used to examine referrals from health care practitioners throughout Hong Kong. As many as 150 patients will go through this room in one morning session.

Most of the other rooms at Yaumatei are used for examining the large number of patients with booked appointments. The set-up of these rooms is similar to that of the casualty room with two ophthalmologists and one nurse assigned to each. Other services provided at Yaumatei include examination of lepers, MR's, low vision patients, school children, and specialty clinics for blindness certification and specific pathologies. The clinic also operates outstation clinics where eye care services are provided to less central areas in Hong Kong, Kowloon and the New Territories.

Conclusion

Despite the differences mentioned among the visited clinics, there are many ways in which they are similar. Because of the large number of patients seen each day, only a limited time is spent with each of them. Except at the Polytechnic, complete oculovisual assessments are almost never done. The examinations are strictly symptom-based and targeted toward the chief complaint. There is little or no time for the ophthalmologist to educate or counsel the patient. Many of the time-consuming or repetitive procedures, which in Canada would normally be performed by a prescribing professional, are the responsibility of nurses, orthoptists and optical technicians. At government funded institutes, the attitude of the physicians toward their patients is sometimes not as cordial as it should be but this is understandable when one sees the difficult circumstances with which they are faced daily. Hong Kong patients traditionally show a great deal of respect for physicians and many believe in taking medications. So for patients with no anomalies detected, ophthalmologists will show no reluctance in prescribing vitamin pills or artificial tears for its placebo effect. However, there are also many Hong Kong patients who will not seek health care until the pathology is at a more advanced stage. Health education is not emphasized in Hong Kong, especially preventive health care. This provided the students with opportunities to see ocular pathologies at their end stages long after the point at which treatment would have been initiated if the patients were in Canada.

Every clinic visited by the Canadian students had its share of patients with unusual ocular disorders at advanced stages. Examination of these patients with the binocular indirect ophthalmoscope, slit lamp, direct ophthalmoscope or fundus lens was perhaps the most valuable aspect of the program in Hong Kong. Equally as valuable were the numerous surgical procedures witnessed in operation theatres equipped with state-of-the art instruments and in the operation rooms with more limited resources. Most of the ophthalmologists encountered by the students were very receptive and were willing to take time to share insights or elaborate on any of the pathologies that were presented. Considering the number of patients that had to be examined, this was well appreciated by the students. All in all, the summer programme in Hong Kong was extremely well organized and the clinical experience gained at each of the five locations has proven to be invaluable.

Acknowledgments

Our thanks to Dr. George Woo, School of Optometry, University of Waterloo and the Department of Diagnostic Sciences at Hong Kong Polytechnic for making this summer programme possible. This project is also funded in part by the Canadian Optometric Education Trust Fund (COETF).

VISION CARE NEWS/ACTUALITÉ OCULO-VISUELLE

Dr. Emerson Woodruff Retires from U of W

Faculty, staff, friends and family joined Emerson and Doris Woodruff at dinner on the campus of the University of Waterloo to mark his retirement as of July 1, 1988 from the School of Optometry. In his after dinner remarks, Dr. J.G. Sivak, present Director of the School of Optometry and Associate Dean of Science for Optometry, said:

> In 1967, twenty-one years ago, the College of Optometry of Ontario became integrated with the University of Waterloo as the School of Optometry. The original faculty number five; four, Professor Fisher, Drs. Bobier, Long and Lyle, were from the College of Optometry. The fifth, Merrill Emerson Woodruff, joined them from Indiana University where he was teaching and completing graduate studies. These five were responsible for establishing the School in its new location. The challenges they faced were enormous. They had to revise the optometry programme and integrate it within the Science curriculum of the University of Waterloo. They had to develop a major optometry clinic designed to provide a comprehensive clinical service to the University and the community of Kitchener-Waterloo. They had to assist the profession of Optometry in dealing with a number of critical legislative issues. They had to promote, plan and organize the construction of the Optometry building. They had to initiate and develop a new graduate programme. All of this was accomplished in little more than six years from the move to Waterloo. This record of achievement is incredible, particularly knowing the adversity experienced in developing a relatively new non-medical health profession. Those of us with more recent histories at Waterloo tasted some of that adversity as recently as four years ago when the Minister of Colleges and Universities withheld approval for provincial funding of the Ph.D. programme in physiological optics. Fortunately, a subsequent minister reversed that decision. Emerson Woodruff was deeply involved in all the activities I mentioned, particularly in developing the optometry clinic and the graduate programme. It is with sincere respect and admiration that I salute Emerson and his four colleagues. I hope the next generation comes close to matching their accomplishments.

Three of the original faculty members, Drs. Claire Bobier, Walwyn Long and William Lyle, were present. Each reminisced on working with Dr. Woodruff, highlighting his accomplishments and contributions to optometric education at Waterloo.

A presentation was also made by Mr. Gérard Lambert, Executive Director of the Canadian Association of Optometrists, on behalf of Dr. Tom Adamack, President of the national Association. In a letter to Dr. Woodruff, read on this occasion, Dr. Adamack cited his many accomplishments on behalf of CAO:

> It gives me a great deal of pleasure to join with your many colleagues in honouring you and your long and distinguished career in Optometry.
>
> As President of the Canadian Association of Optometrists, I need look no farther than our Association's library and archives to uncover volumes of evidence of your contribution to the profession in Canada. Mr. Lambert is more familiar than I am with the long hours of meeting, research and preparation that have gone into these pages, but it is no exaggeration to say that your direct input has been a virtual fixture in nearly all of CAO's most important presentations to many different departments of the federal government over the past decade.
>
> Many of the advances made by Optometry within Canada's Health Care Delivery System were as a direct result of the federal government's response to issues and concerns raised by CAO in Briefs and Submissions researched, written and signed principally by Dr. Emerson Woodruff, acting as consultant to the CAO president and Council of the day.
>
> In addition, I know that , like many other members of the Waterloo faculty, you have been quick and unselfish in providing support and expertise to our corporate members, the provincial Associations of Optometrists, in their own programs and submissions to government. Particularly when the issue related either to Optometry as an academic asset to a University, or as a valued member of the Community Health Team, your experience provided valued support to our provincial affiliates.
>
> On this occasion, on behalf of your many colleagues — many of whom are former students as well — I wish you and Doris only the very best for the future. As for the past, it speaks for itself and we can only offer you our sincere thanks and appreciation for a matchless contribution to Optometry in Canada.

Dr. Woodruff responded to the previous speakers, aptly demonstrating what Dr. Bobier has described as "his happy tongue and nimble wit." Recalling the people and events of the past 21 years, Dr. Woodruff had special thanks to his family, friends and colleagues for their support and encouragement. He concluded that he had no qualms about the future of Optometry in Canada when he saw that the leaders of the profession are among the 1150 Waterloo graduates in practice today.

Dr. Sivak (r) presents the commemorative clock to Dr. Woodruff (photo by Dr. B.R. Chou)

VISION CARE NEWS/ACTUALITÉ OCULO-VISUELLE

Among the gifts presented to Dr. Woodruff were a VIA Rail engineer's cap, recalling his first job as a fireman on the CPR, and a clock with a commemorative plaque. Although now officially retired, Dr. Woodruff will continue to participate in clinical education by supervising the weekly Pediatric Clinic at the School of Optometry. Dr. G.M. Bélanger, the Editors and staff of the *CJO*RCO*, join with the profession in wishing Emerson and Doris Woodruff many happy retirement years together.

And So Does "Mr. T."

November 30, 1988 marked the closing of another chapter in the history of Canadian Optometrical education. On that date, Hartley Thompson retired from his position in the teaching of Mechanical and Optometrical Optics at the University of Waterloo. 1989 will be the first year that some member of the Thompson family has not been associated with the teaching of Optometry in Canada in 65 years.

In 1923 James Carl Thompson was teaching at the Central Technical School in Toronto. He was assigned to teach Optics to the group of students who were enrolled in the Optometry course. When the College of Optometry opened its doors on St. George Street in 1925, he was appointed the first Dean and assumed the position in 1926. He held this position until his death in 1948.

His younger son Howard graduated from the College of Optometry in 1946, and became a part time clinical instructor in 1948. Howard served in the clinic for more than twenty-five years. After the School became part of the Faculty of Science at the University of Waterloo, Howard was one of those who gave much of his time in assisting in the clinic, commuting from his office in Bramalea.

Howard Thompson has three sons, all of whom have graduated from the Optometry program at Waterloo. Jim graduated in 1975, Dave in 1976 and Rick in 1979. Thus there were members of the Thompson family as students in the Optometry program at Waterloo from 1971 until 1979.

Hartley Thompson studied at the College after returning from overseas service in the armed forces and became an optician. He practiced for a time in Toronto, and in 1964 joined the College on a part time basis, teaching in the Mechanical Optics laboratory. When the College moved to the University of Waterloo, Hartley was appointed on a full time basis as the supervisor of the laboratory, and was placed in charge of ordering all ophthalmic prescriptions required in the clinic. As the clinic became established and expanded, Hartley was given assistance in part of his duties and devoted himself to the teaching function. In his spare time he attended the University and in 1974 was awarded the BA degree. Hartley has been very active in the Masonic order, being elevated to the 33rd degree.

Hartley and Iona were tendered a fitting retirement party in the Laurel Room of the South Campus Hall on November 14, 1988.

Many faculty, staff and friends assembled to wish Mr. Hartley Thompson, "Mr. T." to many recent graduates, all the best on his impending retirement. After-dinner speakers included Dr. J.G. Sivak and Professor Emeritus E.J. Fisher, who commented on Mr. T's contributions to the School of Optometry and its predecessor, the College of Optometry of Ontario. Mr. Jack Sargent, School Factotum until his retirement in 1987, read a poem he had penned for the occasion, recalling Hartley's career and activities. Mr. Don Sirrka, President of the Optometric Students Association, presented best wishes and several gifts on behalf of Mr. Thompson's students.

In his remarks accepting the gifts presented by students, faculty and staff of the School of Optometry, Mr. Thompson spoke of his many happy memories of his 21 years at Waterloo. He noted that for the last 65 years, the Thompson family has had a close continuous association with the School of Optometry and the College of Optometry of Ontario, which involved his father, the late Dean J.C. Thompson, and his brother, Dr. Howard Thompson, who presently practices in Bramalea. With Hartley Thompson's retirement, an era in Canadian optometric education has come to an end. We wish him and his wife, Iona, every happiness — and continued good luck at the bridge table!

Hartley and Iona Thompson in a quiet moment during their retirement dinner. (photo by Dr. B.R. Chou)

Other News

Dr. Anthony P. Cullen, Associate Director of the School of Optometry, University of Waterloo, has been appointed to the Examination Council of the National Board of Examiners in Optometry (Washington, D.C.); he also chairs the Ocular/Visual Biology sub-committee and co-chairs the joint committee with the Ocular Disease/Trauma sub-committee. Dr. Cullen has been involved with the NBEO for many years, starting as an item writer in 1972.

After 6 years of work, the **Canadian Standards Association** has announced the latest revision of the Standard Z94.3-M1988, Industrial Eye and Face Protectors. This extensive revision is intended to be more readable than previous ones. Information on obtaining a copy of the new standard is available by contacting your regional office of the CSA.

Visual Science Museum to Host International Ocular Heritage Group

The Museum of Visual Science and Optometry will play host to the Ocular Heritage Society on May 12, 13 and 14, 1989. The Society consists of a group of optometrists, ophthalmologists and opti-

VISION CARE NEWS/ACTUALITÉ OCULO-VISUELLE

cians who share a keen interest in all matters concerning the historical background of items related to the eye care professions. The Society meets annually to visit places of ophthalmic interest, conduct historical papers sessions, exchange discoveries and ideas relating to the past. There is a social program and good fellowship. Frequently a trading session is held when members bring duplicate materials and buy, sell or exchange them with each other. Previous meetings have been held in New Orleans at Tulane University Department of Ophthalmology, San Francisco at the Academy of Ophthalmology Museum, St. Louis at the AOA Museum and Washington University Rare Books Museum. Any interested Canadian optometrists are invited to attend. If desired, papers may be submitted for use in the program. For further details, contact Professor E.J. Fisher, School of Optometry, University of Waterloo, Waterloo, Ontario N2L 3G1.

Editor's Note: *The foregoing School of Optometry, University of Waterloo news items were contributed by Dr. B. Ralph Chou (Woodruff retirement, co-author of Thompson retirement, Cullen, CSA announcements) and Professor Emeritus Dr. E.J. (Ted) Fisher (co-author of Thompson retirement, Museum announcement).*

The university Gerry Hagey built mourns his death

Dr. Joseph Gerald Hagey, founding president of the University of Waterloo and the president emeritus for nearly twenty years, died October 26, 1988 at the age of 84.

A resident of Kitchener, he retired as UW's president in 1969, but stayed active in hobbies and as a frequent visitor to campus, and had started work on his memoirs.

At UW, his name is preserved on such monuments as the Hagey Hall of the Humanities, built the year he retired, and the Hagey Lecture Series.

But Gerry Hagey's real monument is the University of Waterloo itself. He was the prime mover behind the founding of this university, the first in Canada to offer co-op (''work-study'') programs.

Hagey was born in Hamilton, Ontario, in September 1904, and was educated in Hamilton and at Waterloo College, a small church-related institution on Albert Street. He graduated from the University of Western Ontario with a BA degree in 1928.

Following advertising and sales experience in Kitchener and Toronto he joined B.F. Goodrich Canada Ltd. (now Uniroyal Goodrich Canada Inc.,) in Kitchener, and served as its national advertising and public relations manager from 1935 to 1953. In 1952, he served as president of the Association of Canadian Advertisers. He was also active in community affairs, such as Rotary and the Waterloo Chamber of Commerce.

During this period Gerry Hagey maintained a deep interest in educational affairs, serving on the board of governors of Waterloo College for six years. In 1953 he was chosen president of the little college.

As one token of how much Hagey had done for the university, UW awarded him honorary doctor of laws (LLD) degree in 1969 after his retirement. Another honorary degree came from WLU, the other university that grew from his Waterloo College. Hagey also received honorary degrees from Susquehanna University, in Pennsylvania (1958); from Sir George Williams University (now Concordia), Montréal; and from the University of Western Ontario.

Among his non-academic honours was membership in the Order of Canada.

Hagey married Minota Margaret Weichel, of Waterloo, in 1929. The Minota Hagey Residence for graduate students at UW was named for her. They had two sons, Robert Gerald, who died in Owen Sound on October 16, and John Edward.

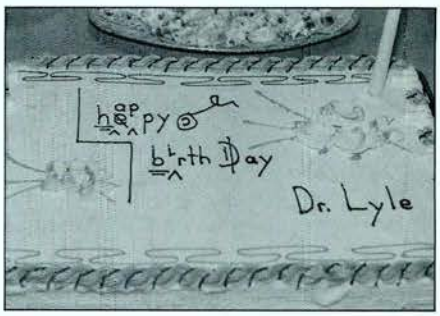
Following the death of his first wife, in 1965. Hagey married Eleanor Duff in 1967.

The UW news bureau announced the day after Hagey's death that a J.G. Hagey Memorial Fund is being established.

Said the announcement: ''The fund will honor his memory in an appropriate way, to be determined with the guidance of friends and members of the Hagey family.''

(Source: University of Waterloo *Gazette*, Nov 2, 1988)

A fitting message for an editor!



Faculty and staff at the School of Optometry, University of Waterloo gathered on the afternoon of 4 October 1988 to celebrate the 75th birthday of Dr. William Lyle. Our photographer caught the guest of honour in a rare pose — with his feet up! The CJO • RCO also wishes Dr. Lyle all the best on this happy occasion. (Photographs courtesy of Dr. T.D. Williams)

Essilor International Offers Prize for Paper on Presbyopia

The Essilor International Company has announced that it will award a prize of 60 000 F for distinguished research in presbyopia.

The company advises that the competition is open to ''researchers, ophthalmologists, opticians, optometrists, physiologists, technicians and engineers'' working on the theme of presbyopia.

The 1989 Essilor Prize will be presented in conjunction with the 4th International Essilor Symposium on Presbyopia, slated to be held in Marrakech later this year. Interested candidates must submit their work in either English or French no later than March 31, 1989.

Information: Essilor, Direction de l'Innovation, 1 Rue Thomas Edison, 94028 Créteil, Cedex, France.

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Dr. Paul Clark — World Champion

Dr. Paul Clark, an optometrist practicing in Terrace, BC, set a world's record Sunday, November 6, 1988 in Oita, Japan when he won the International Wheelchair Marathon in a time of 1 hour, 38 minutes and 27 seconds.

In an interview with the *CJO*RCO* following the race, Dr. Clark said that, for him, the biggest thrill was the excitement of the race itself, as well as the accomplishment of winning.

"As far as I'm concerned," he added, "wheeling is not a recreational sport for the disabled, but a demanding sport for able-bodied people as well! It's a sport, period."

Disabled in an accident 15 years ago, Dr. Clark has been racing for the past nine years. He also competed in the International Wheelchair Olympic Marathon held in Seoul, Korea following the 1988 Summer Olympic Games. Marathoning, he said, is not as difficult for a wheelchair athlete as it is for a runner and he actually competed in two marathons within two weeks.

Japan was "more thrilling" than Seoul, "because of the better weather conditions". He also reports that he had the pleasure of shaking the hand of Japanese Prince Hiro, who attended the race. (When he finally decides to retire, Dr. Clark may well turn up with his own television show — Handshakes of the Famous. He noted that in 1981 he had shaken the hand of Queen Elizabeth when he was one of a select few achievers named for a special meeting with Her Royal Highness.)

Like its parent footrace, the International Wheelchair Marathon covers a distance of exactly 42.195 km. Dr. Clark also advises that he plans to continue competing for a while yet and that his next race likely will come in the Spring.

He is in the process of securing sponsorship, a process that will very definitely have an impact on his continued competition. "It is very expensive," he added, "and I can't afford it myself so I'll need some good sponsors."

Dr. Clark has been an optometrist since being graduated from the University of Waterloo in 1981. Of his racing, he concludes by noting that "I could never have participated in this sport without the wonderful assistance of my wife, Karin. She was once a gymnast and has contributed a lot of her knowledge and experience to assist me in my training and in the marathons themselves."

Along with, we are sure, all of Canadian Optometry, the *CJO*RCO* extends a hearty congratulations and well-done to Dr. Paul Clark, world record holder.

1988 Canadian Candidates for Admission to the American Academy of Optometry

At its 1988 meeting, held in Columbus, Ohio, the American Academy of Optometry was pleased to announce that the following Canadians were successful candidates for admission to fellowship in the Academy (indicated by the designation "FAAO" in professional credentials):

Dr. Michael J. Doughty, Waterloo, ON
Dr. John G. Flanagan, Waterloo, ON
Dr. Kenneth W. Gellatly, Calgary, AL
Dr. Claude Giasson, Montréal, QC
Dr. Linda Kuhn, Markham, ON
Dr. Langis Michaud, Québec, QC
Dr. Jules Plante, La Salle, QC
Dr. Dennis Ruskin, Scarborough, ON
Dr. Harry Van Ymeren, London, ON

The Editors extend a sincere congratulations to each of the successful candidates. (Source: Dr. Brian Garnett, London, ON)

Polymer Tech Establishes Boston Lens ® Lab in Vancouver

Polymer Technology Corporation, effective September 1, 1988, has appointed Precision Technology Services Ltd. (formerly CooperVision) in Vancouver as an authorized Boston Lens laboratory.

The company also announced that Cooper's entire staff will remain with Precision Technology under the ownership and management of Bob Heavyside.

The Boston product line includes the Boston II, IV and Equalens and the company advises that they will also send out solution starter kits with all Boston Lenses ordered.

VISION CARE NEWS/ACTUALITÉ OCULO-VISUELLE

Optical Protection Factors of Selected Safety Lenses

A paper under the above title has been published by the Ontario Ministry of Labour's Occupational Health and Safety Division and appears in Volume 9, Number 4 (Fall, 1988) of their bulletin, *Occupational Health in Ontario*.

Written by Marian Cotnam (a final year student in the University of Waterloo's OD program), Dr. B.R. Chou and Dr. A.P. Cullen (faculty members in the Waterloo School of Optometry's Optical Radiation Laboratory), the paper presents spectral transmittance curves for ten plano safety lenses over the waveband 200 to 2,500 nm and, from the data, derives protection factors for ultraviolet C (UVC), UVB, UVA, blue light and near infrared (IR) radiation. The relevance of variations that occur, as they relate to the ocular hazards of ultraviolet and short wavelength visible radiation, is discussed.

Copies of the issue are available for $3.00 each from the Ontario Government Book Store, 880 Bay Street, Toronto, ON, M7A 1N8. Specify the name of the publication and issue number as identified above. If paying by cheque, please make it payable to the "Treasurer of Ontario".

1988 Fall Convocation Awards at Waterloo

At its 1988 Fall convocation, the School of Optometry, University of Waterloo, presented the following awards and degrees:

OD degree:

Dr. Stephen George Briggs, Owen Sound, ON

Dr. Saida Valimohamed Ahmed Lalani, North Vancouver, BC

Dr. Roma Pushka, Sarnia, ON

Dr. Hafiz Hassanali Walji, Weston, ON

MSc (Physiological Optics):

Kathryn A. Dumbleton, BSc, MBCO

PhD (Physiological Optics):

Angela C. Kothe, BSc, OD

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VISION CARE NEWS/ACTUALITÉ OCULO-VISUELLE

Coming Events

*(**Note:** For further information on an event sponsored by the Canadian Association of Optometrists, contact the CAO Office in Ottawa. For an event sponsored by a provincial Association or Society of Optometrists, contact the respective hosting organization. The address for an international or outside Canada event is included with the item.)*

1989

MARCH / MARS

24 - 30 Seventh Asian Pacific Optometric Congress
Malaysia
Part 1: March 24, 25 at the Shangri-la Hotel (Kuala Lumpur)
Part 2: March 26 - 30 at the Tanjung Aru Beach Hotel (Kota Kinabalu, Sabah, North Borneo)

Information:
IFAPAO Secretary-General
Dr. Damien P. Smith
7 Cookson Street
Camberwell 3124, Victoria
Australia
Tel. (03) 882-9122

APRIL / AVRIL

08 - 10 Vision Expo Week
incorporating OptiFair™
International Trade Fair and Conference
Anaheim, CA, USA

Information:
Vision Expo West
Cahners Exposition Group
999 Summer Street,
PO Box 3833
Stamford, CT
06905, USA
Tel. (203) 964-0000

MAY / MAI

29 - June 24 School of Optometry, University of Waterloo 1989 Continuing Education Program

Information
Jeff Hovis, OD, PhD
School of Optometry
University of Waterloo
Waterloo, ON
N2L 3G1
Tel. (519) 885-1211

JUNE / JUIN

22 - 25 Optics Asia '89 International Exhibition
(Singapore Optical Trade Association)
World Trade Centre, Singapore

Information:
ITP Services (Private) Limited
994 Bendemeer Road
No. 04 - 03
Singapore 1233
Attn. Jimmy Bong
Director and Project Manager

24 - 29 92nd Annual Congress of the American Optometric Association
The New York Hilton and Towers
New York, NY

Information:
American Optometric Association
Congress Manager
243 N. Lindbergh Blvd.
St. Louis, MO
63141, USA
Tel. (314) 991-4100

AUGUST / AOUT

1 - 4 Canadian Association of Optometrists
Association Canadienne des Optométristes
RENDEZ-VOUS OTTAWA '89
21st Biennial Congress
21e Congrès Biennal
Ottawa, Ontario

SEPTEMBER / SEPTEMBRE

23 - 25 International Vision Expo™ and Conference
Incorporating OptiFair™
Jacob Javits Convention Center
New York, NY

Information:
Rocco Sacci / Jeff Davis
The Alden Group
c/o Cahners Exposition Group
999 Summer Street
PO Box 3833
Stamford, CT 06905
USA
Tel. (212) 867-6400

1990

APRIL / AVRIL

23 - 25 The British College of Optometrists
"Frontiers of Vision"
10th Anniversay Conference
Royal College of Physicians
Regents Park
London, England

Information:
Bell Howe Conference (OPT)
Gothic House
Barker Gate
Nottingham NG1 1JU
England
Tel. 0602 410679

BOOK REVIEWS/LU POUR VOUS

Geometric, Physical and Visual Optics *by Michael P. Keating, Butterworths, 1988, 577 pp.*

Conçu comme un ouvrage de base en optique, s'adressant à des étudiants de première année en optométrie, ce livre remplit parfaitement l'objectif que s'est assigné son auteur, physicien et vice-doyen du Collège d'Optométrie de Ferris State University. On retrouve bien sûr dans ce volume les notions d'optique géométrique et d'optique physique requises pour la formation générale d'un optométriste, elles sont présentées dans une séquence rationnelle et de façon didactique. Mais l'originalité et l'intérêt de cet ouvrage résident dans les applications que l'auteur fait de ces notions, dans le domaine de l'optique ophtalmique, de l'optique physiologique ou de l'instrumentation clinique. Par ce livre, l'étudiant est amené rapidement à établir le lien entre les diverses branches de l'optique et à constater que cette discipline est une des sciences fondamentales de l'optométrie.

Les onze premiers chapitres sont consacrés aux systèmes sphériques dans les conditions paraxiales. L'auteur utilise la notion de surface d'onde pour traiter dans les cinq premiers chapitres de lois fondamentales de l'optique géométrique et de leurs applications aux lentilles minces dans l'air. Dès le sixième chapitre, les amétropies et leur correction, de même que l'accommodation sont abordées d'un point de vue optique. Dans les chapitres suivants, la réfraction sur des interfaces sphériques, de même que l'étude des lois de la réflexion sont présentées accompagnées de leurs applications pratiques en optométrie. Finalement, les équations de Gauss apparaissent dans le dernier chapitre de cette section.

Le chapitre douze (complété par l'appendice A) montre l'intérêt de l'utilisation des matrices et du calcul matriciel en optique, un sujet que l'auteur a certainement à coeur, si l'on en juge par ses publications antérieures. Le grossissement angulaire introduit par différents systèmes optiques, le grossissement induit par une lentille ophtalmique et le grossissement relatif de l'image rétinienne font l'objet de deux chapitres, comme d'ailleurs les caractéristiques optiques de l'astigmatisme et des systèmes astigmates. Le chapitre sur les propriétés optiques d'un prisme est immédiatement suivi par celui sur les caractéristiques prismatiques des lentilles ophtalmiques. On retrouve ensuite comme dans tout ouvrage d'optique les inévitables chapitres sur les champs et les aberrations, mais comme ailleurs dans l'ouvrage, les notions fondamentales sont aussi appliquées à l'oeil ou aux lentilles ophtalmiques dans le cas des aberrations.

Les chapitres 21 à 24 sont consacrés à l'optique physique, mais l'application des notions acquises permet aussi d'aborder des sujets pratiques tels que la réfraction par l'optomètre au laser, les traitements anti-reflets, la limite de résolution ou la diffusion des milieux oculaires. Enfin, le dernier chapitre intitulé "distribution spatiale de l'information optique" constitue une intéressante introduction à des notions fondamentales et plus actuelles, relatives à la fonction de transfert optique (FTO).

Cet ouvrage, qui ne constitue pas une véritable traité d'optique (il ne comporte entre autre aucune référence bibliographique et n'est pas exempt d'erreur), rassemble néanmoins l'ensemble des notions requises pour passer avec succés les examens d'accés à la pratique de l'optométrie aux U.S.A., du moins en ce qui concerne l'optique géométrique et l'optique physique. D'un niveau parfaitement accessible à un étudiant de premier cycle universitaire, le texte comporte aussi de nombreux exemples d'applications sous forme de problèmes avec leurs solutions. Chaque chapitre se termine par une série de questions dont les réponses sont rassemblées à la fin du volume. Les illustrations sont abondantes, la représentation des surfaces d'ondes contribue à surcharger celles des premiers chapitres.

Ce livre est certainement une acquisition à faire pour un étudiant qui commence sa formation en optométrie. Pour sa part, un praticien désireux de se rafraîchir la mémoire sur certaines questions d'optique y trouvera sont compte. Il y découvrira aussi une approche moderne et intégrée de cette science.

P. Simonet, OD, MSc, FAAO
Professeur-adjoint
École d'Optométrie
Université de Montréal

Binocular Indirect Ophthalmoscopy *by JW Potter, LP Semes, AA Cavallerano, MJ Garston. 1988 Butterworths USA, 86 pp. Illustrated. Spiral coil bound.*

This book's slim, compact format, suggesting a quick reference guide, is speedily misleading. Open it, for example, to p. 28 and read, "The field into which the patient is looking is the area of fundus being examined. (For example, for right-eye examination, when the patient looks toward his/her right shoulder, the inferior temporal portion of the right eye is being observed.)" This is a nine-line (in this book) paragraph that is repeated verbatim on p. 44 and again on p. 46!

Things the authors felt we needed to be taught:

1. "a drawing of the ocular fundus serves many purposes"
2. "Nothing can be drawn that is not truly observed . . ."
3. "It may be possible to compare drawings of several patients to make important observations."
4. "Before beginning any fundus drawing, the first step is to examine the entire ocular fundus until the clinical findings are known well enough for a drawing to be made."
5. "A drawing provides meticulous documentation of the condition of the ocular fundus at the time of the examination."

It appears to this reviewer that the authors got together with an instrumentation dealer who, in turn, provided them with a textbook illustrator from the company ranks. The company is mentioned, but no binocular indirect ophthalmoscope is called by its name, thus precluding comparative advice. How can a book with such a title not offer some hints for purchase?

One single, small illustration is printed in full colour. It depicts a colour-coding used nowhere else in the book. The fussy drawings also contain details not usually associated with medical art.

Instead of a few lines explaining basic optics, ten whole pages are used up in the first chapter, in describing the history of binocular indirect ophthalmoscopy. The Preface, meanwhile, promises numerous tables for the second chapter. Here they are:

Table 1: This is a checklist of three items.

Table 2: Nine numbers comparing four parameters for three lens powers.

BOOK REVIEWS/LU POUR VOUS

Table 3: Patient Preparation Checklist — consisting of three sentences, none of which is over three words long.

There are only four chapters and a six-page bibliography. There is no Index.

Paradoxically, the book is verbose and overly simplified at the same time. It lacks a scientific approach but does, however, make an entertaining evening's read if you are not yet using a binocular indirect ophthalmoscope.

If, however, you have ever attended a Continuing Education lecture on binocular indirect ophthalmoscopy, your notes are likely to be much more practical, informing you, for example, why binocular indirect is more advantageous than other types of ophthalmoscopy, and how to select your patients, neither of which you will be told by this book.

Helen A.C.S.M.K. Feeley, BA, OD
Optometrist
Ottawa, ON

Vision Therapy in a Primary Care Practice *by Jerome and Joy Rosner. 1988, Professional Press Books, Fairchild Publications, New York, NY. 148 pp. of text. Bibliography and Index. 18 figures, 12 tables. Includes appended 120 page Procedures Manual.*

If Vision Therapy seems to be a neglected aspect of practice and even, in some areas, a forgotten and abandoned skill, it certainly is not the fault of Drs. Jerome and Joy Rosner. Dr. Jerome Rosner has devoted most of his professional life to this discipline. As far back as 1956, in Philadelphia as a school consultant, he published the first of many papers on this subject.

This new text and Manual is the latest of his dedicated efforts to convince practitioners to engage in this challenging field, a field far more challenging and rewarding, in this reviewer's opinion, than contact lens fitting — but not so headline catching.

Those practitioners who regularly attend lectures, congresses and seminars requesting information that they can take home today and use tomorrow will be admirably served by this text. The organization of the book's eight chapters and the Manual is superb.

The work is actually a two-volume series — a hardcover text describing the philosophy of Vision Therapy and a paperback containing 50 vision training procedures.

The text, as noted, comprises eight chapters, the first of which deals with guidelines for implementing a therapy programme and the last of which focusses on management, including instruments and fees.

The remaining chapters cover vergence infacility, accommodative infacility, intermittent strabismus, amblyopia, constant strabismus and perceptual skills dysfunction. There are case reports to illustrate and explain each of these problems.

The Procedures Manual lists 50 different procedures intended to help remedy the anomalies discussed in the main text. Each procedure is presented in a similar format: equipment, set-up, activities, special instructions. As can be expected, the authors stress perceptual skills, both auditory and visual. Instruments are listed and their specific routines and uses are described clearly and concisely.

The authors admit that the "cookbook" approach is a deliberate presentation designed to motivate practitioners to implement Vision Therapy in any practice. After a careful reading of this work, no optometrist could offer any reasonable excuse for not incorporating Vision Therapy into office routine.

Students will find this work to be an encouragement to give Vision Therapy the place it deserves in Optometry's spectrum of services.

GM Bélanger, OD
Optometrist
Senior Editor, *CJO*RCO*
Ottawa, ON

Ocular Motility *by VC Hansen, CO, COMT, for the* Ophthalmic Technical Skills *series. 1988, Slack Incorporated, 125 pp.*

This book is one in a series of twelve, written for ophthalmic technicians. It is basic, well-organized and concise. The author is a Certified Orthoptist (CO) and a Certified Ophthalmic Medical Technician (COMT).

The book is divided into eight chapters and begins with a description of the anatomy and function of the extraocular muscles and their physiology, followed by chapters on strabismus, history taking with differential diagnosis, concluding with sections on treatment and prognosis.

Most optometrists will find this book to be very basic. The information provided will serve as a review of primary ocular motility studies. Due to the author's medical background, some of the terminology used in this book deviates from that found in optometric texts.

The three chapters, "History Taking", "A Systematic Approach to Strabismus" and "Differential Diagnosis" are of note for their logical presentation of the questions asked, the procedures done and the diagnosis made in the unique and specific examination of patients with ocular motility problems.

Treatment is covered in a short chapter which gives only the most fundamental discussion of orthoptics, pharmacology, glasses, prism therapy and surgery.

For practitioners who want to review ocular motility and relevant testing procedures, this book is well-organized and easy to read for that purpose. If practitioners, however, want to expand their knowledge of the subject, there is very little to be gained from reading this text.

JE Barbour, OD
Optometrist
Ottawa, ON

LETTERS/COURRIER

Editor, CJO*RCO

Your editorial "Loss by Default" was a timely one. Many articles in Optometric Journals are related to the health of the eye, recognition of disease, and the use and side effects of drugs. This is good to know for referral purposes but there is a tendency to make us a profession of "almost doctors". The next step is the treatment of minor diseased conditions of the eye. We were taught to refer anything definite or doubtful and leave the diagnosis and treatment to the doctor. The emphasis was on optics, and good refractive procedures, and on the proper and skillful fitting of the aid to vision. It seems in the new emphasis we are forgetting our specialized field — vision care. Even in the Association's "Brief to the House Standing Committee on Health and Welfare" there was no reference to the important field of Vision Therapy which is an area of vision in which our education uniquely enables us to specialize. When are optometrists going to learn to specialize in Vision Care, including Low Vision and Vision Therapy? Our progress in the Low Vision Clinics is encouraging. It seems to me we have spent enough time and energy impressing the authorities with our knowledge of disease and pharmacology, in which fields we can never be recognized as authorities.

My son Ross was at Waterloo recently and spoke to Dr. Bobier about vision therapy. His response was related to further research, and how it should be done. Last year the AOA released a study made by an ad hoc Committee appointed by the Convention of 1985 on research done on the efficacy of vision therapy. It was an extensive study and had many pages of references to research already done and continuing. The Chairman of the CAO Committee on Children's Vision sent me a copy which the AOA had sent to him and asked me to write an introduction for CAO, which I did. The overwhelming impression is that there has been adequate research to demonstrate Vision Therapy as an effective method of solving visual problems of a motor rather than a refractive type. The problem is lack of interest and enthusiasm, as you point out in your editorial. To my mind, the Waterloo School does not seem to recognize the importance of applying on a daily basis the knowledge they have and impart to the students

For the most part, our office is busy enough to keep two full-time therapists busy and at times a third; and this in a general practice. We could use some amazing case histories to inject some enthusiasm into the School.

Excuse my long letter. I am really concerned that what I have learned in clinical study and application, and passed on to my son becomes an integral part of the practice of optometry.

Dr. H.W. Moore
Winnipeg, MB

PRESIDENT'S PODIUM/MOT DU PRÉSIDENT

(continued from page 223)

on what we are presently calling **Save Your Vision Week**.

It is, after all, the most direct opportunity CAO offers for the individual member to involve him/herself in the community. If your interest is waning, then our total image may fade a bit and I would suggest to you this is the worst that could happen.

Dr. T. L. Adamack
President

(suite de la page 223)

et des soins des yeux qui vont au-delà de la protection?

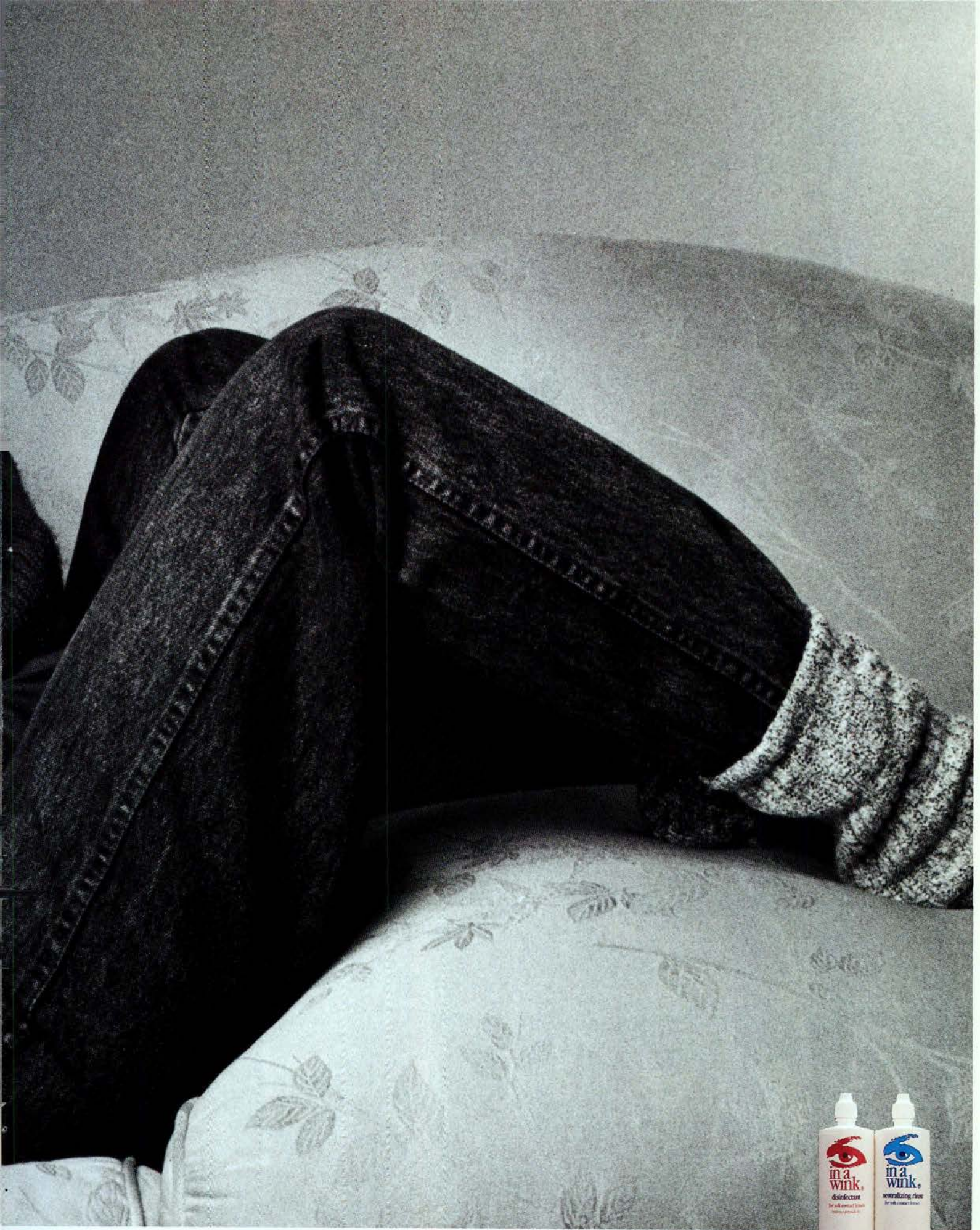
Quel est *votre* avis? Faut-il «protéger» **Save Your Vision Week/La Semaine de la vision**?

Est-ce qu'un nouveau titre raviverait cette campagne un peu fatiguée? Faut-il vraiment la raviver? Si vous avez des idées sur ce que nous appelons actuellement **Save Your Vision Week/La Semaine de la vision**, écrivez directement à votre conseiller de l'ACO ou à moi-même, aux soins de l'ACO.

Après tout, c'est la façon la plus directe que vous offre l'ACO de participer à la vie communautaire. Si vous perdez tout intérêt, c'est toute notre image qui s'en ressentira et, à mon avis, ce serait bien la pire chose qui puisse arriver.

Le président,
Dr T.L. Adamack

How many hours do you think she can spare for lens care?



With In a Wink, all she needs is 25 minutes. Because that's all it takes to disinfect and neutralize soft contacts once they've been cleaned. For lens care when there's no time to spare.

In A Wink
Fast & Flexible
CIBAVision

Atlantic Optometric Continuing Education Symposium 1989

May 12, 13
Château Halifax Hotel
Halifax, Nova Scotia

12 Credit Hours

LECTURES — MAY 12

CE Maxner, MD, FRCP (C) — 9:00 a.m.

I "Pupillary Disorders"
II "Ocular Motility — Pattern
III "Afferent System Problems of Multiple Sclerosis"
(3 credit hours)

Malcolm MacLeod — 2:00 p.m.

"Professional Liability"
(½ credit hour)

George L White — 1:30 p.m.

"It's Legal — We're Partners!"
(½ credit hour)

JM Wild, BSc, MSc, PhD, FBCO — 2:30 p.m.

"Automated Perimetry and Its Interpretation"
(2 credit hours)

LECTURES — MAY 13

Pauline V Beal, OD, FAAO — 9:00 a.m.

"Low Vision in Private Practice"
(3 credit hours)

Gene Edworthy, OD — 1:30 p.m.

"Sports Vision — Diagnostic and Treatment Applications of Microcomputers"
(3 credit hours)

SOCIAL PROGRAM

Wine and Cheese Reception: Friday evening, May 12
Sponsored by Topcon, Canon, Allergan Humphrey Inc.
— Display of Instruments —

Historic Feast/Dinner Theatre ($32.00 per person) — Saturday evening, May 13

Total symposium cost: $150.00 before March 24, 1989
$190.00 after March 24, 1989

Hotel information: Château Halifax ($94.00 single or double/$Cdn)
Tel. (902) 425-6700

Further information and registration forms: Dr. Heather MacDougall, Chairman,
141 Victoria Street, Truro, NS, B2N 1Z4. Tel. (902) 895-0501

The Canadian Journal of Optometry
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ARTICLES

EDITORIALS

BOOK REVIEWS

FEATURES / ANNOUNCEMENTS

Bring on the tears

Not all artificial tears are alike. So when a recent study confirmed that HYPOTEARS drops were preferred 3 to 1 over Tears Naturale for dry eye[1] — the results were no surprise.

Compared to Tears Naturale, the unique hypotonic formulation of HYPOTEARS drops reduce tearfilm tonicity while its superior corneal coverage provides longer lasting relief and comfort.[2]

HYPOTEARS drops. It's no surprise that patients prefer them 3 to 1.[1]

Hypotears* polyvinyl alcohol

Bring on the comfort

References 1. Multi-Center Study, Comfort Evaluation of Hypotears vs. Tears Naturale II. Abelson, M.B., Eye Research Institute, Boston, Massachusetts, 1987. 2. Application of Lacrimal Scintigraphy to the Development of Ophthalmic Formulations, Olejnik, O., et al. Monograph, Queens Medical Centre, Nottingham, England, 1987.

*Trademark

iolab PHARMACEUTICALS a Johnson & Johnson company

NOTICE OF GENERAL BUSINESS MEETING
THE CANADIAN ASSOCIATION
OF OPTOMETRISTS

Friday, August 4, 1989: 9:00 am – 12:00 noon

Salon E
Ottawa Congress Centre

Notice is given pursuant to By-Law 34

CALL FOR RESOLUTIONS

Each resolution by an ordinary member (individual optometrist) shall be signed by a proposer and five other ordinary members and, if by a corporate member (provincial optometric Association), shall be signed by its representative. Resolutions shall be filed with the Executive Director of CAO, Mr. Gerard Lambert, *before* the opening of the Congress, Monday, July 31, 1989.

CAO 21ST BIENNIAL CONGRESS REGISTRATION
August 1-4, 1989, Ottawa, Ontario

Please Print or Type

OPTOMETRIST: _____
surname — first name for badge — degree — year of graduation

_____ _____
Office address — Home address

_____ _____
City — Prov. — Postal Code — City — Prov. — Postal Code

_____ _____
Telephone — Telephone

First CAO Congress? ☐Yes ☐No

SPOUSE/GUEST: _____
surname — first name for badge

JUNIOR DELEGATES:

_____ _____
name — age — name — age

_____ _____
name — age — name — age

Babysitter required? ☐Yes ☐No

Registration Fees (Includes Meals)	Postmarked by May 31	After May 31
Optometrist	$385	$450
Spouse/Guest	$265	$325
Junior (6-15)	$175	$225
Preschool Daycare	$ 75	$125

Total Fee Enclosed: $ _____

Does anyone in your family require a special diet or have special needs?
Please specify:

Please Note: You may arrange your hotel accommodations directly with the hotel. A hotel reservation card will be mailed to you with your receipt.

Return this form with your cheque to:
CAO
Suite 301, 1785 Alta Vista Dr.
Ottawa, Ontario K1G 3Y6

CAO use only: Reg # _____ Fees # _____ Date _____ Cash Rec'd _____
ck rec'd _____ CN _____ Note _____

AVIS DE L'ASSEMBLÉE GÉNÉRALE DE L'ASSOCIATION CANADIENNE DES OPTOMÉTRISTES

Le vendredi 4 août: 9h00 - 12h00

Salon E
Centre des Congrès, Ottawa

Avis donné conformément au Règlement 34

APPEL DES RÉSOLUTIONS

Chaque résolution proposée par un membre ordinaire (optométriste privé) doit être signée par celui (celle) qui la propose et par cinq autres membres ordinaires et, si elle est proposée par un membre collectif (association provinciale d'optométrie), elle doit être signée par son représentant. Les résolutions seront déposées auprès du directeur général de l'ACO, M. Gérard Lambert, *avant* le jour d'ouverture du congrès biennal le lundi, 31 juillet 1989.

21e CONGRES BIENNAL DE L'ACO
1-4 août 1989, Ottawa (Ontario)

Prière de dactylographier ou d'écrire en lettres moulées

OPTOMÉTRISTE:

Nom _____ Prénom pour le porte-nom _____ grade _____ année de promotion _____

Adresse du bureau _____ Résidence _____

Ville _____ Prov. _____ Code postal _____ Ville _____ Prov. _____ Code postal _____

Téléphone _____ Téléphone _____

Est-ce votre premier congrès de l'ACO?
☐ Oui ☐ Non

CONJOINT(E):

Nom _____ Prénom _____

JEUNES:

Prénom _____ Âge _____ Prénom _____ Âge _____

Prénom _____ Âge _____ Prénom _____ Âge _____

Est-ce qu'une gardienne est nécessaire? ☐ Oui ☐ Non

Droits d'inscription: (Repas inclus)	**Avant le 31 mai**	**Après le 31 mai**
Optométriste	385 $	450 $
Conjoint(e)	265 $	325 $
Jeune (6-15)	175 $	225 $
Garderie pré-scolaire	75 $	125 $

Total inclus: $ _____

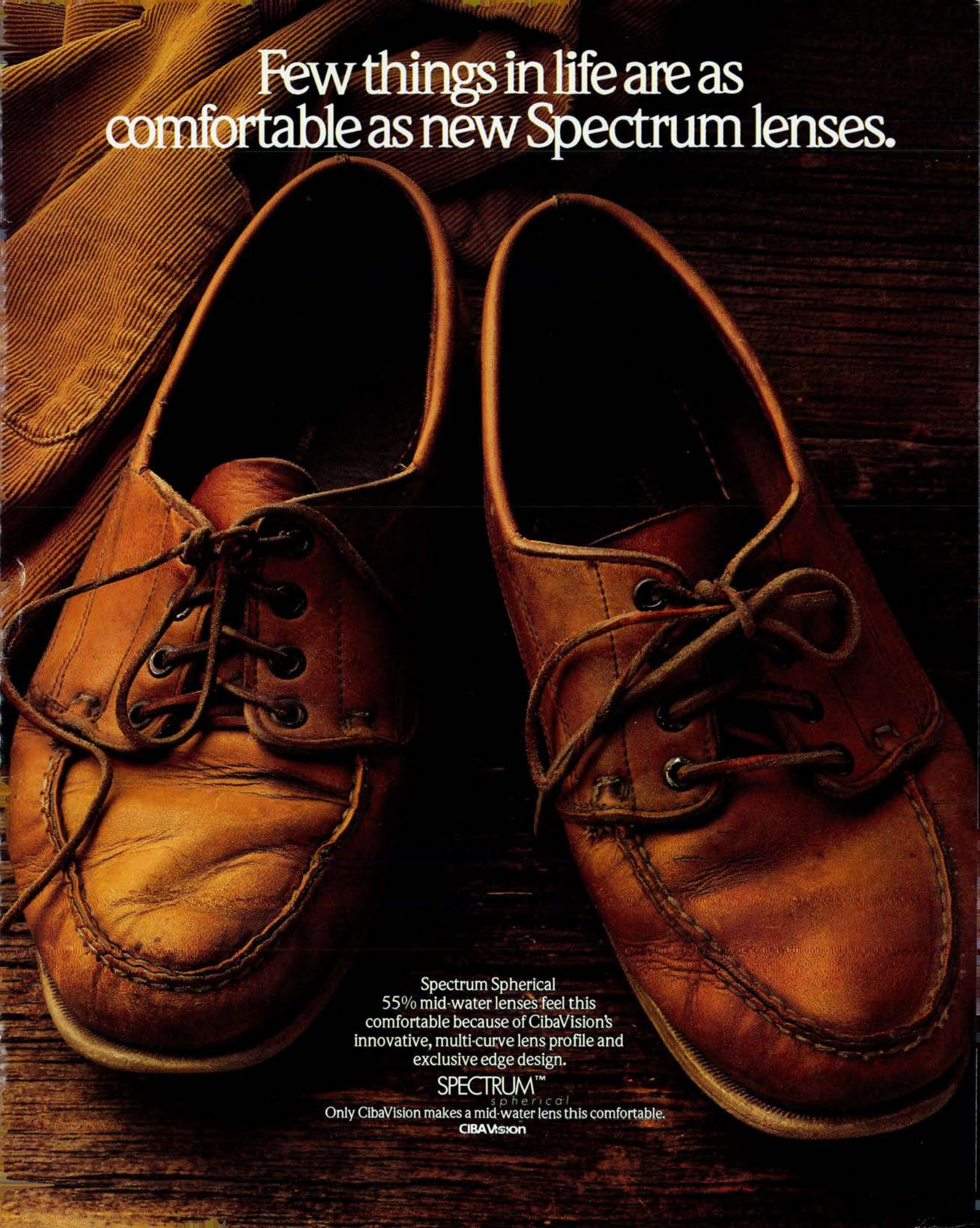
Est-ce que quelqu'un dans votre famille a besoin d'une diète spéciale ou a des besoins spéciaux? Veuillez spécifier:

À noter: vous devez faire vos réservations directement avec l'hôtel. Une carte de réservation vous sera envoyée avec votre reçu.

Retournez cette formule avec votre chéque à:
ACO
301-1785, prom. Alta Vista
Ottawa (Ontario) K1G 3Y6

Réservé à l'usage du bureau de l'ACO
N° d'inscr. _____ N° des droits _____ Date _____ Argent reçu _____
Ch. reçu _____ N° de ch. _____ Remarque _____

Few things in life are as comfortable as new Spectrum lenses.



Spectrum Spherical
55% mid-water lenses feel this comfortable because of CibaVision's innovative, multi-curve lens profile and exclusive edge design.

SPECTRUM™
spherical

Only CibaVision makes a mid-water lens this comfortable.

CIBAVision

What's missing in the perfect saline?

Preservatives.

Preservatives cause irritation.
Because Lens Plus
contains no preservatives, only
pure saline,
you can be sure your contact
lens wearers enjoy irritation-free eyes.
At a price they can afford.

LENS PLUS™
recommend perfection

ALLERGAN
SCIENCE WITH VISION