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THE CANADIAN JOURNAL OF Optometry

Features
Low Vision
Swinging Flashlight Test
CALS Lens
Ocular Myasthenia Gravis
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LA REVUE CANADIENNE d'OPTOMÉTRIE

MARCH/MARS 1983

VOL. 45 NO. 1

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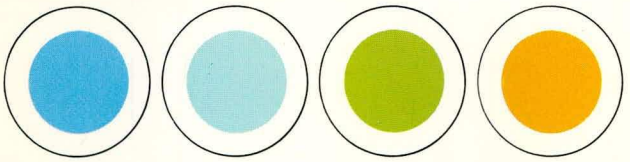

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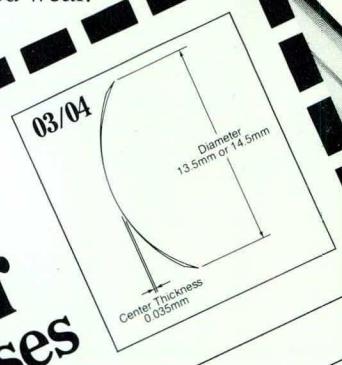

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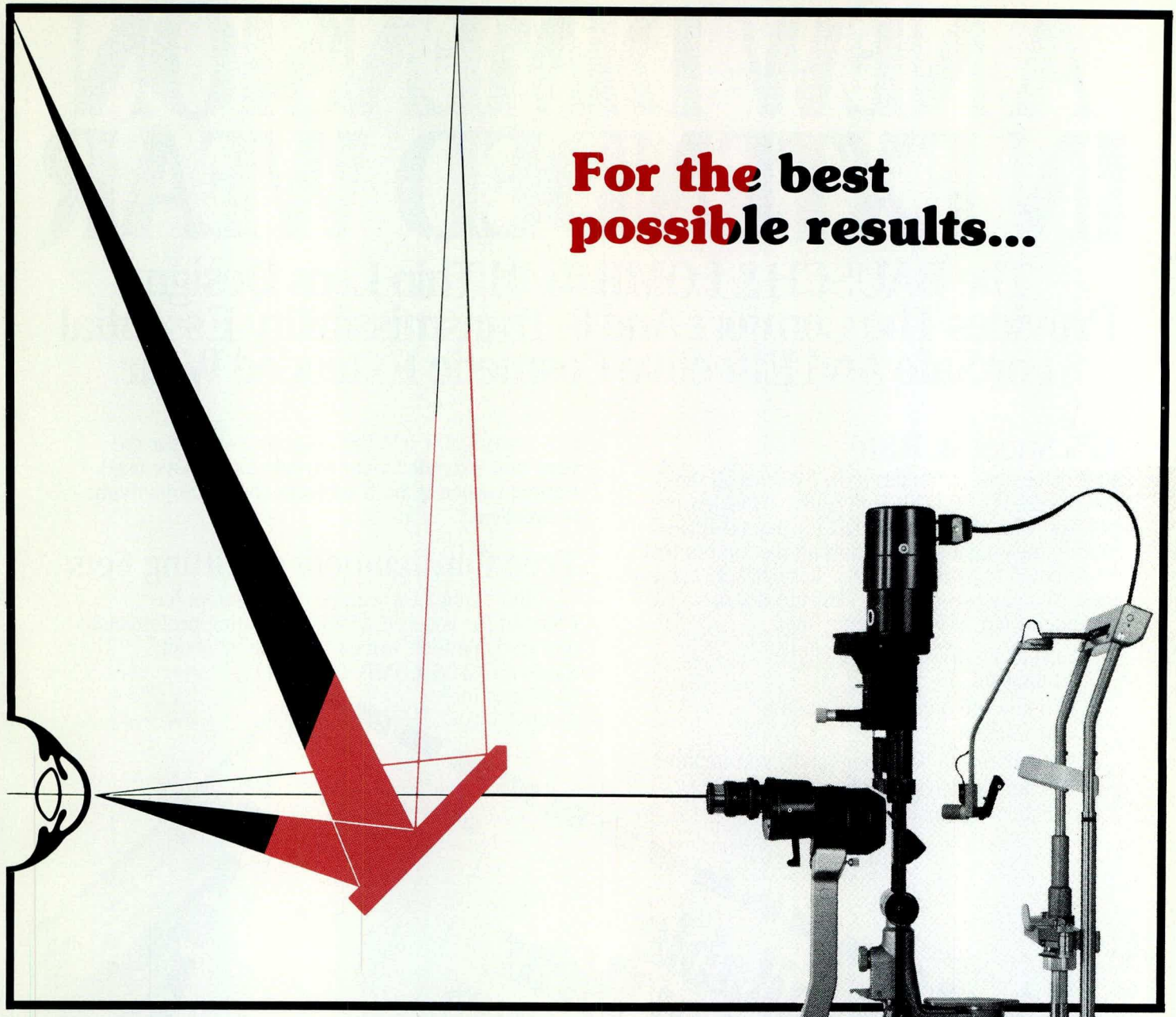

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COVER

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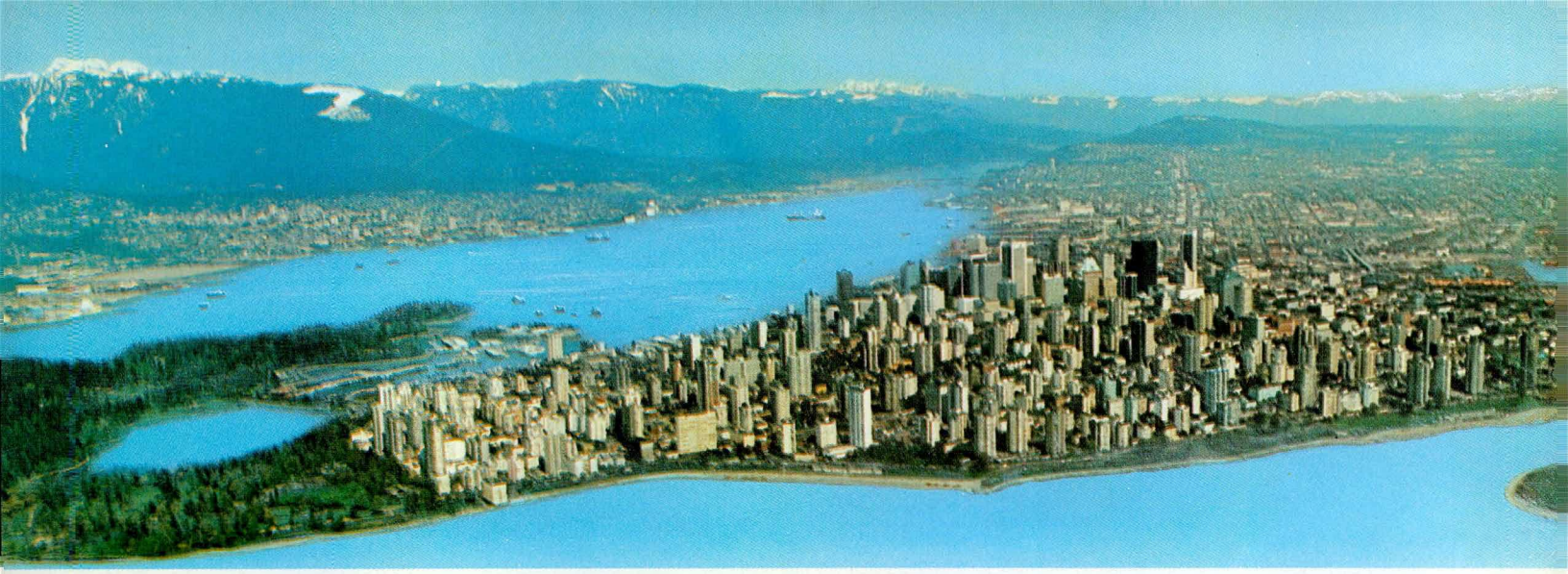
Canadian Journal of Optometry
Revue Canadienne d'Optométrie

In this Issue



A Letter to Canadian Optometrists

Dear Colleagues,

This is an invitation to you and your family to attend the Canadian Association of Optometrists' 18th Biennial Congress, July 5-8, 1983. By now you will have received a beautifully-packaged presentation from the B.C. government, including two lavishly-illustrated publications featuring scenes in and around Vancouver, whose Bayshore Hotel is this year's Congress site.

Those photos should give you some idea what we mean when we say that this year's Congress takes place in Pacific Paradise. We think that we have an unforgettable program to offer you this summer — the Britannia cruise, the Royal Hudson rail excursion, the Royal Hawaiian motif for the closing banquet, a fully-supervised junior delegates' program and, of course, a superb schedule of professional lectures with an ophthalmic exhibit that is already booked to ¾ of the hall's capacity.

To remind you of an old saw — the early bird gets the worm. Early bird registrants (those whose registration is received *before May 15*) will receive almost a 20 per cent discount on their fees (optometrist and spouse). Included as a part of the promotional mailing was a Congress Program Registration form. I urge you to fill it out now and return it immediately to:

C.A.O. Biennial Congress
Suite 207 - 77 Metcalfe Street
Ottawa, Ontario
KIP 5L6 Tel. (613) 238-2006

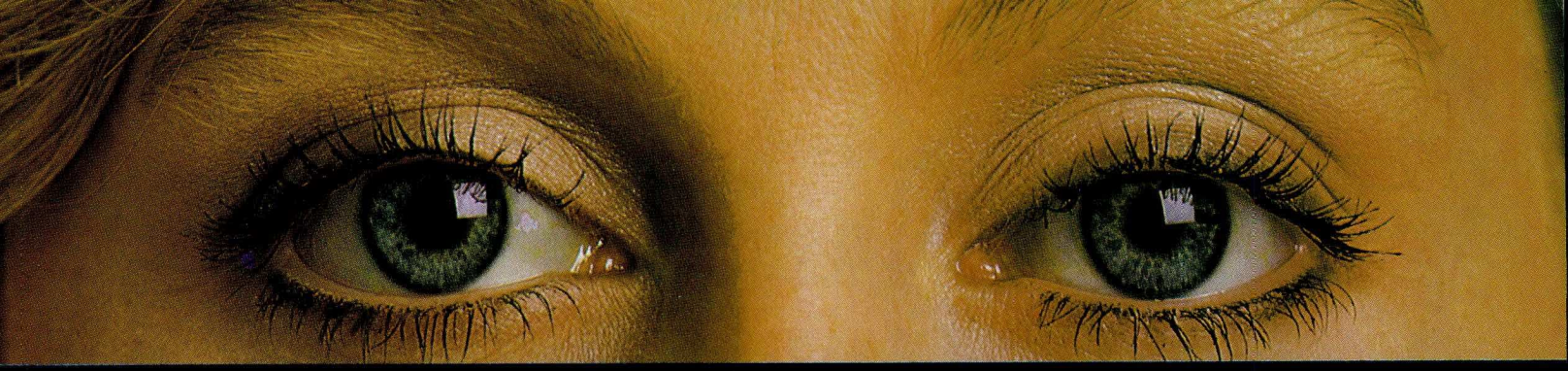
If, for any reason, you haven't received a Congress registration, please write to Michael J. DiCola, Administrative Program Co-ordinator, at the same address and one will be forwarded to you immediately.

On behalf of President des Groseilliers and this year's Local Arrangements Committee, I look forward to welcoming you to Pacific Paradise, the C.A.O. 18th Biennial Congress, July 5-8, 1983, Bayshore Hotel, Vancouver, B.C.

Sincerely

Sherman Olson

Sherman Olson, Chairman
Local Arrangements Committee



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LETTERS

Editor, C.J.O.

I am taking this opportunity to provide an opinion other than that expressed in the guest editorial concerning automated field screening (CJO 44(1): 4-5, 1982).

The advent of automated field screeners has introduced a variety of instrumentation which have been undergoing developmental difficulties during their formative years. These problems are inevitable in the attempt to develop instrumentation capable of testing something as intricate and subtle as the human visual field. Indeed, initial studies of some of these devices were less than salutory and indicated that the instruments were of dubious benefit to practitioners.[1-5]

However, further technological advances have added to the sophistication, reliability and practicality of these instruments. Several recent studies have shown extremely encouraging results.[6-10] Most notably, one type of automated perimeter detected 100% of a sample of individuals with a field defect due to some form of optic nerve disease.[8,11] This impressive result is given even greater stature with the fact that only 86% of these same field defects were detected by manual kinetic Goldmann perimetry. In an even more recent study, in a neuro-ophthalmology practice, 99.2% of a variety of abnormal visual fields were detected by automated perimetry.[12] In addition to this screening function the automated perimeter is even proving useful in monitoring glaucomatous visual field progression.[13] Thus, it would appear that automated perimetry cannot be dismissed lightly and "although it is not the most sensitive or sophisticated form of visual field testing, ... it provides an efficient, reliable alternative to manual perimetry for many practitioners."[13] (The most sensitive and sophisticated form of testing is by Tubingen static perimetry).

Above all, practitioners should be aware of the limitations (validity, reliability) of any test procedure they use, whether it be automated field screening, tonometry or ophthalmoscopy to name a few. It is certain that false negatives cause the greatest concern with any test procedure, but, the results of any one test are merely contributory to inductive and/or deductive logic and should not preclude further thought or consideration on the part of the professional.

The above discourse is not intended to urge all optometrists to purchase automated field screeners but to provide them with another perspective such that they may make a quantum 'inductive' leap themselves.

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M.J. Samek

Editor, C.J.O.

Having read the Guest Editorial "Problems with Automated Field Testing" (CJO 44(1): 4-5), I am somewhat dismayed by the lack of documented clinical evidence justifying the opinions regarding automated field testers. If one is to accept the figures presented that approximately 2% of the general population have some field anomaly and that 30% of these present with no additional evidence, then it can be concluded that 30% of field defects (i.e. about one in three) would be missed because the examiner's suspicions were not sufficiently aroused. Since this group cannot be distinguished from the 98% with no field defect, it becomes a formidable task to make the differentiation.

It is apparent that the productivity of the optometrist conducting a field test on every patient, although ideal, is too low to be practical. Yet the problem remains. Possible solutions could be to have a skilled technician conduct a field test routinely on all patients, or to have access to some form of automated field tester.

Many of the recent studies[1,2,3,4] have been primarily concerned with the Friedmann Visual Field Analyser (FVFA) which was described by Friedmann in 1966.[5] All the authors referenced state that the FVFA is a valuable tool in the detection of visual field problems. Also, the deficiencies of the instrument are predictable and can be compensated with relative ease. Apparently the new Mk II model FVFA has additional features which will eliminate some of the difficulties: clinical studies will answer that question. Unfortunately there is not extensive information on other automated screeners, but their design is somewhat similar. Since most of these devices make use of a static method, which is recognized as more sensitive than the usual kinetic technique, and some make use of multiple stimulus presentation which takes advantage of the extinction phenomenon, it is possible that a well designed field screener can be as sensitive in detecting relatively subtle defects as the traditional tangent screen.

The purpose of a field screener is to identify departures from normal for referral and definitive measurement, not to replace the practitioner in the performance of field testing. The prudent practitioner will not be satisfied with only a screening conducted on a patient with other clinical evidence suggesting a field problem, however should those without signs be left untested? What of the 30% of those with defects who would go undetected?

The editorial also states that two of the premises behind the development of automated field testers are as follows:

1) "It is a waste of time for a practitioner to test fields". It is stated that practitioners are not finding field defects because they are not testing the right people, or are not using the right test. This statement is obviously true, however even when the "suspects" are tested, field defects are relatively rare. It may indeed be inappropriate for the busy practitioner to spend inordinate amounts of time with unproductive testing. If field screeners are as reliable as reported, possibly the practitioner's time would be better spent quantifying the fields of those identified by an automated device.
2) "A machine, especially an expensive machine, can do it better". I do not think that any clinician would agree to this statement simply because we are in a world inundated with technology. I agree that a thoughtful practitioner will do a better job than a machine in detecting field defects, however no practitioner can afford to bury his head in the sand and ignore the benefits that technology can provide to make him a better clinician. The bottom line becomes

patient care and if new instrumentation can be demonstrated to be effective, we should welcome it.

In conclusion, I would propose that we should not be prepared to discount the advantages afforded to us by technology, particularly when clinical evidence is supportive, because our "seat of the pants" impression is that professional intuition or an "element of luck" will somehow solve the problem. If optometry is not prepared to acknowledge the fact that new instrumentation can provide the tools to assist us in providing "state of the art" vision care, then we may find ourselves delivering the "Model-T" of eye care.

Rodger Pace, O.D., F.A.A.O.
Associate Chief of Clinics
School of Optometry, University of Waterloo

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Standards for Protective Eyewear

The standards for protective eyewear recently published by the Canadian Standards Association apparently have given some optometrists cause for concern. A number of associations are questioning what would appear to be a serious omission from the standards, namely the thickness of lenses required to meet CSA approval.

No thickness was stipulated by CSA; as long as the lenses will withstand what has been set out for non-fracture, they are acceptable. It should be pointed out also, that with new products becoming available, and new techniques for tempering, the day may come when a lens but 1.0 mm thick, or even less, may withstand breakage by the means set forth in the standards.

It should be remembered that when prescription protective eyewear is required, the eye care practitioner is the final authority, and if she/he wishes to stipulate lens thickness, it must be provided by the laboratory as an essential of the prescription.

It is hoped that this will serve to provide optometrists and associations with an interpretation of what CSA sought to accomplish for both the present technology and that of the future, while recognizing that changes in the standards can be made should the need arise.

Garson Lecker O.D., F.A.A.O.
Sydney, N.S.

Editor, C.J.O.

Thank you for your most interesting case report in the June CJO (Vol. 44, #2).

I believe I may have the answer as to why patient L.C.'s near vision blurred.

You corrected her right eye with a truncated soft toric lens (I presume there was some prism present in the lens although this was not stated.)

In a lens of this design, orientation of the lens on the cornea is critical if good acuity is to be achieved. If proper orientation is not maintained, the cylinder of the lens if off axis and hence, vision will blur.

I suggest that, when L.C. is looking at distance, the truncation and prism keeps the truncation parallel with the lower lid; the cylinder is on axis and acuity is good. However, when she looks at the near point, the eyes converge and look down (as well as some torsion but this is a lesser factor) causing the truncation and prism to come in contact with the nasal portion of the lower lid which in turn causes the lens to rotate counter-clockwise (to the observer); hence, the cylinder moves off axis and vision blurs. Careful observation of lens movement while asking the patient to read will confirm my suggestion.

Using a conventionally-designed rigid contact lens should solve this problem since the astigmatism is corrected by the contact lens-tear lens-cornea interface and lens rotation is then no longer a factor to contend with.

J.M. Stevenson, O.D.

NOTICE OF GENERAL BUSINESS MEETING
THE CANADIAN ASSOCIATION OF OPTOMETRISTS
Wednesday, July 6, 1983, 1:30-5:30 p.m.
Thursday, July 7, 1983, 1:30-5:30 p.m.

BAYSHORE INN, VANCOUVER, BRITISH COLUMBIA

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 ordinary members, and if by a corporate member (provincial optometric association) shall be signed by its representative, and resolutions shall be filed with the Executive Director before the opening day of the Biennial Congress, July 6, 1983.

AVIS DE LA
RÉUNION DES AFFAIRES GÉNÉRALES
L'ASSOCIATION CANADIENNE DES OPTOMÉTRISTES
Mercredi, 6 Juillet, 1983, 1330h-1730h
Jeudi, 7 Juillet, 1983, 1330h-1730h

BAYSHORE INN, VANCOUVER, COLOMBIE-BRITANNIQUE

Avis donné conformément au Réglement 34

. . . . . .

APPEL DES RÉSOLUTIONS

Chaque résolution proposée par un membre ordinaire (optométriste privé) sera signée par celui qui la propose et par cinq membres ordinaires, et si proposée par un membre constitué en société (association provinciale d'optométrie) sera signée par son représentant, et les résolutions seront déposées auprès du directeur exécutif avant le jour d'ouverture du congrès biennal le 6 juillet 1983.

GUEST EDITORIAL

Low Vision: The Neglected Component Within the Blindness Matrix

Next August will mark the seventh anniversary of Professor Cyril Greenland's publication, *Vision Canada,* which described the unmet needs of the visually handicapped. The December, 1976 issue of *The Canadian Journal of Optometry* reviewed the document and its various proposals for the inclusion of optometric services in the reorganized activities of the Canadian National Institute for the Blind (CNIB). The CNIB itself was to assume an ombudsman's role in the coordination and utilization of community and professional resources.

The mounting dissatisfaction of low vision patients and low vision clinicians in recent months suggests that something has gone wrong. Were the recommendations proposed by Professor Greenland inappropriate? Were they improperly implemented? Or were they just ignored?

The consistency of *Vision Canada's* proposals for low vision services with those contained in the recently-published *Low Vision Service Standards from the National Accreditation Council for Agencies Serving the Blind and Visually Handicapped* supports their validity and relevance. The Partially-Sighted Society, the Visual Impairment Association and the National Association of Orientation and Mobility Instructors of Britain and The American Foundation for the Blind have all recently advocated a low vision service consistent with the recommendations of Professor Greenland. How is it then that an organization (CNIB) with such obvious success in its orientation and mobility training, its community rehabilitation and its library and visitation programs has failed so miserably in its provision of low vision services? The partially-sighted continue to be lumped in with the totally blind in the overall rehabilitation process so that many do not seek registration. This approach to rehabilitation of the partially-sighted patient continues to be unfair. Groups of partially-sighted patients are becoming more and more concerned that their retention of some sight should not be a barrier to their rehabilitation. The utilization and enhancement of their residual vision must be approached with the same zeal and use of available resources that currently is reserved for sight substitution programs. There is a need for the inclusion of a comprehensive and professional low vision evaluation as a fundamental part of a quality service to low vision patients.

The only structured Canadian system with this emphasis exists in the Province of Quebec. There are three excellent facilities within the Province, and the promise of more to come. All of them operate outside CNIB jurisdiction. It is significant to note that, in each of these instances, the low vision services are administered by optometrists. At a recent ad hoc meeting in Montreal, optometrists from across Canada, with special interests in the low vision field, observed and discussed the clinics in Quebec. The meeting also provided an opportunity for optometrists to express their concerns about the existing service program and to discuss potential solutions for its deficiencies.

The four objectives adopted by this group are those previously agreed upon by the Visual Impairment Association in Britain.

1) to advance the well-being of visually impaired people,
2) to consider and make recommendations for improving the total provision of services to visually impaired people,
3) to work toward an organization which encompasses all workers with visually impaired people, and
4) to establish links between such workers and to provide a forum for the exchange of information and expertise between them.

Since the publication of *Vision Canada,* optometry has had only sporadic involvement with the CNIB. A few optometrists presently serve on several regional CNIB advisory boards. Some CNIB registrants have consulted optometrists for low vision assessments, and rehabilitation workers and field workers for the CNIB have privately endorsed several optometric low vision facilities. Formally, however, the CNIB central administration in Toronto refuses to acknowledge the potential contributions that optometric services would provide. They continue to patronize optometry and offer the perennial enticement of optometric involvement in a proposed model Low Vision Centre, operated and managed by the CNIB and retaining both consulting optometrists and ophthalmologists. A coordinator of low vision services for the CNIB publicly bemoans the need for expanded low vision facilities with more personnel and better training. In direct contradiction, the CNIB recently released a pamphlet purporting to describe low vision services in this country. This pamphlet ignores totally the contributions of optometry in this field. This unique pattern of optometric exclusion from CNIB sponsored regional, national and international programs has been obvious for some time. For example, in 1981 when the CNIB hosted The American Association of Workers for the Blind meeting, it deliberately ignored Canadian Optometry in spite of the inclusion of two Canadian optome-

trists in the AAWB program. On the same occasion, CNIB witnessed the honours bestowed upon an international key note speaker for his work in establishing a first class low vision clinic with optometrists serving as key workers.

It is now time for optometry to stand back from these frustrating dialogues with the CNIB and state its position firmly and unequivocally. The effective and successful delivery of low vision services can only be accomplished when optometrists are included in the interdisciplinary team. The recognition, by the Department of Health in New Brunswick, of optometry's capability to provide the information required for the certification of blindness, demonstrates that there is absolutely no rational barrier precluding optometric involvement. An interdisciplinary team has been described as a "group of people from diverse disciplines needing one another to work at a common task using different avenues of intervention in search of the same goal." Optometry is an internationally recognized profession working in the low vision field. Faced with continued procrastination by the CNIB, the optometric profession and the partially-sighted may ultimately be forced to create alternative programs similar to those already existing in the Province of Quebec. The rigidity of the CNIB system, which, by its very mandate, ignores the partially-sighted until they become legally blind, gives an additional incentive for this approach. Euclid J. Herie, an executive with the CNIB, advocated the following five principles for developing and evaluation programs for the handicapped:

1. The individual must be treated as a total person, rather than as a physical, social or emotional problem.
2. At the start of rehabilitation it is not what we think is wrong with the individual, but what the individual feels he needs that should be the foremost concern.
3. Inherent in the philosophy of rehabilitation is the right of every human being to those services which will enable him to fulfill his greatest potential: where knowledge is available to minimize his disability and to equalize his opportunity, he should receive such benefits.
4. Agencies and personnel involved in rehabilitation must view the individual as an integral part of his cultural, social and familial milieu.
5. The community has a responsibility to see that the services necessary for rehabilitation are available.

The adherence to these principles only for the functionally blind by the CNIB continues to arouse the ire of the partially-sighted. Let us hope the CNIB will recognize its service gap in this important area. Optometry, as a primary care discipline with an established expertise in low vision, *must* direct its energies toward the successful establishment of a program in Canada for the needs of both the partially-sighted and the legally blind. It would be a delusion, however, to assume that having a great number of people look into the problem separately is the equivalent of a true "team" approach. Surely it is incumbent on the CNIB to ensure that all of the "team" approaches occur simultaneously. The partially-sighted in Canada deserve the best possible low vision care that can be provided for them. How long do they have to wait for such programs to be implemented across this country?

Drs. G.C. Woo, J.G. Strong
School of Optometry
University of Waterloo

Basse vision: composante négligés de la matrice de la cécité

En août prochain, aura lieu le septième anniversaire de la publication, par le Professeur Cyril Greenland, de *Vision Canada,* qui décrivait les besoins non satisfaits des handicapés visuels. L'exemplaire de décembre 1976 de *la Revue canadienne d'optométrie* examinait ce document et les diverses propositions qu'il contenait, visant à inclure des services optométriques dans de nouveaux programmes de l'Institut canadien pour les aveugles (INCA). L'INCA lui-même devait assumer un rôle de protecteur du public dans la coordination et l'utilisation des ressources professionnelles et communautaires.

Le mécontentement croissant ressenti ces derniers mois par les patients handicapés visuels et par les cliniciens en vision basse suggère que ce système ne fonctionne pas. Les recommandations formulées par le Professeur Greenland ne sont-elles pas bonnes? Ou bien, n'ont-elles pas été bien appliquées? Ou simplement ont-elles été ignorées?

La conformité des propositions de Vision Canada sur le service aux handicapés visuels, avec celles publiées récemment dans les Low Vision Service Standards (Normes de service aux handicapés visuels) du National Accreditation Council for Agencies serving the Blind and Visually Handicapped (Conseil national d'agrément pour les agences servant l'aveugle et le handicapé visuel) est une preuve de leur validité et de leur à propos. La Partially Sighted Society, La Visual Impairement Association et la National Association of Orientation and Mobility Instructions of Britain, ainsi que l'American Foundation for the Blind, ont toutes récemment annoncé qu'elles étaient en faveur d'un service

aux handicapés visuels, conforme aux recommandations du Professeur Greenland. Comment se fait-il alors qu'un organisme (l'INCA) ayant un tel succès avec ses programmes de formation d'orientation et de mobilité, de réhabilitation communautaire, de bibliothèque et de visites ait si misérablement échoué dans la fourniture des services aux handicapés visuels? Les handicapés visuels continuent à être assimilés aux personnes atteintes de cécité totale dans le processus global de réhabilitation, si bien qu'un grand nombre d'entr'eux ne veulent pas s'inscrire. Ce processus de réhabilitation des patients jouissant d'une vue partielle continue à être injuste. Des groupes de patients ayant une vue partielle sont de plus en plus convaincus que le fait qu'ils jouissent d'une basse vision ne doive pas constituer un obstacle à leur réhabilitation. Il faut s'occuper de l'utilisation et de l'amélioration de leur vision résiduelle avec autant de zèle et de resources que l'on consacre à l'heure actuelle aux programmes de substitution de la vue. Une évaluation intégrée et professionnelle de basse vision doit constituer l'élément fondamental d'un service de qualité aux patients handicapés visuels.

Le seul système canadien structuré comportant un tel programme existe dans la Province de Québec. Il y a trois excellentes installations dans cette Province, et une autre est prévue. Toutes ces installations fonctionnent en dehors de la juridiction de l'INCA. Il est important de noter que dans toutes ces installations, les services aux handicapés visuels sont administrés par des optométristes. Lors d'une réunion ad hoc tenue récemment à Montréal, des optométristes de tout le Canada s'intéressant particulièrement au domaine de la basse vision, ont observé et étudié ces cliniques du Québec. Cette réunion permit également aux optométristes d'exprimer leurs inquiétudes au sujet du programme de services existant, et d'examiner des solutions possibles pour les améliorer.

Ce groupe a adopté quatre objectifs, qui sont les mêmes que ceux de la Visual Impairement Association de Grande-Bretagne.

1) Améliorer le bien-être des handicapés visuels,
2) Etudier et faire des recommandations afin d'améliorer la fourniture globale de services aux handicapés visuels,
3) Essayer de créer un organisme qui regroupe tous les travailleurs s'occupant de la basse vision,
4) Etablir des liens entre ces travailleurs, et fournir un forum leur permettant d'échanger des renseignements et des connaissances.

Depuis la publication de *Vision Canada,* l'optométrie n'a eu que de rare contacts avec l'INCA. Quelques optométristes font à l'heure actuelle partie de divers comités consultatifs régionaux de l'INCA. Quelques membres de l'INCA ont consulté des optométristes pour des évaluations de basse vision, et des travailleurs sur le terrain et des travailleurs s'occupant de réhabilitation de l'INCA ont en privé recommandé plusieurs installations optométriques de basse vision. Cependant, officiellement, l'administration centrale de l'INCA à Toronto refuse de reconnaître les contributions que les services optométriques pourraient apporter. Elle continue à utiliser l'optométrie à ses fins et parle toujours d'impliquer l'optométrie dans sa proposition de Centre modèle de basse vision, opéré et géré par l'INCA et utilisant des optométristes, aussi bien que des ophtalmologistes à titre de conseillers. Un coordinateur des services de basse vision à l'INCA déplore ouvertement l'absence d'installations plus importantes s'occupant des handicapés visuels, et de personnel ayant une meilleure formation. En contradiction directe avec cela, l'INCA a récemment publié une brochure ayant la prétention de décrire les services aux handicapés visuels dans ce pays. Ce pamphlet ignore totalement la contribution de l'optométrie dans ce domaine. Cela fait quelques temps que ce processus unique d'exclusion de l'optométrie des programmes régionaux, nationaux et internationaux parrainés dans l'INCA existe. Par exemple, lorsqu'en 1981 l'INCA a servi d'hôte à la réunion de l'American Association of Workers for the Blind, elle a délibérement oublié l'Optométrie canadienne, malgré la participation de deux optométristes canadiens au programme de l'AAWB. Par la même occasion, l'INCA a du constater les honneurs conférés à un conférencier étranger pour son oeuvre de création d'une clinique de première classe pour handicapés visuels, employant comme collaborateurs clés des optométristes.

Il est temps maintenant que l'optométrie cesse ce dialogue frustrant avec l'INCA, et définisse sa position d'une manière ferme et non équivoque. On ne peut fournir efficacement et avec succès des services aux handicapés visuels que si des optométristes font partie de l'équipe interdisciplinaire. Le fait que le Ministère de la santé du Nouveau Brunswick reconnaisse à l'optométrie le droit de fournir les renseignements requis pour certifier la cécité, démontre qu'il n'existe absolument pas de barrière qui interdise la participation de l'optométrie. On a défini une équipe interdisciplinaire comme "un groupe de gens appartenant à des disciplines diverses ayant besoin les uns des autres pour travailler à une tâche commune en utilisant différentes méthodes pour parvenir au même but." L'optométrie est une profession dont le rôle vis-à-vis des handicapés visuels est reconnu internationalement. Etant donné l'inertie de l'INCA, la profession optométrique et les handicapés visuels vont devoir, en dernier recours, créer des alternatives de programmes similaires à ceux qui existent déjà dans la Province de Québec. La rigidité du système de l'INCA, qui, à cause de son mandat, ignore les handicapés visuels tant qu'ils ne sont pas complètement aveugles, donne une incitation supplémentaire à cette solution. Euclid J. Herie, membre de l'exécutif de l'INCA, a énoncé les cinq principes suivants de développement d'un programme d'évaluation pour les handicapés visuels:

1) L'individu doit être traité comme une personne entière, plutôt que comme un problème physique,

social ou émotionnel.

2) Au début de la réhabilitation, ce n'est pas ce qui, d'après nous, semble être le problème chez l'individu, mais ce dont l'individu pense avoir besoin qui devrait constituer notre préoccupation principale.
3) Inhérent à la philosophie de la réhabilitation est le droit de tout être humain aux services qui lui permettront de remplir son potentiel le plus élevé: lorsqu'il existe des connaissances qui permettent de minimiser son handicap et d'accéder à l'égalité d'emploi, il faut lui permettre d'en bénéficier.
4) Les agences et le personnel s'occupant de réhabilitation doivent considérer l'individu comme faisant partie intégrante de son milieu culturel, social et familial.
5) La communauté est responsable d'assurer que les services de réhabilitation soient disponibles.

Le fait que l'INCA n'adhère à ces principes que pour ceux qui sont fonctionnellement aveugles continue à soulever la colère de ceux qui ont une basse vision. Espérons que l'INCA reconnaisse le besoin de services dans ce domaine important. L'optométrie, en tant que discipline de soins primaires possédant une expertise reconnue en basse vision, doit s'efforcer à créer, avec succès, un programme canadien qui satisfasse les besoins des handicapés visuels aussi bien que ceux des aveugles légaux. Cependant, il ne faut pas penser que parce qu'un grand nombre de personnes étudient simultanément le problème, le travail va vraiment être "d'équipe". En fait, c'est à l'INCA de s'assurer que tous les efforts soient coordonnés "en équipe". Les handicapés visuels canadiens ont droit aux meilleurs soins de basse vision possibles que l'on puisse leur prodiguer. Combien doivent-ils attendre pour que de tels programmes soient offerts dans ce pays?

Drs. G.C. Woo, J.G. Strong
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Low Vision Services in Quebec — A Working Model for the Rest of Canada

In mid-January of this year, C.A.O. sponsored a two-day study seminar to familiarize a group of optometrists with the structure and operation of the Low Vision services in the Province of Quebec. C.A.O. organized the meeting, which was held at a downtown Montreal hotel.

The meeting's first day included a visit to the Institut Nazareth et Louis Braille located in Longueuil, a south-shore municipality directly across the St. Lawrence River from Montreal.

That afternoon was also devoted to a visit to the Montreal Association for the Blind on Sherbrooke Street in Montreal. This Association is older than the C.N.I.B., which actually plays a very minor role in the overall provision of low vision services in the province.

The third major centre in the province, Institut Louis Hebert, located in Quebec City, was not visited by the group, but J-P Lachance, O.D., Director of the Low Vision Clinic, attended and presented a paper describing the services available in Quebec and some philosophical concepts guiding the provision of those services. Normand Giroux, Director of the Institut Louis Braille, in addressing the group, stressed that the over-riding concept guiding the operation is that of a team, consisting of several different disciplines and professions, including optometry.

The objective of low vision services is to optimize residual vision using visual aids or other techniques to make the subject as mobile and as independent as possible in daily activities, with due respect to age and health of the individual. In short, the low vision patient is treated as a whole person — there is no intention to treat just one element, specifically vision, and neglect the remaining aspects, like living habits, mobility and communication.

The Braille Institut and the Montreal Association were both originally founded to serve the totally blind and legally blind segment of the population. In the years since the Quebec government began providing services to the low vision person (20/70 to 20/200), some 40 - 60% of the clients are low vision subjects. It is estimated that there are 60,000 low vision subjects in the province.

Because LV services are not well-known, most subjects are referred by professionals (not necessarily an optometrist, physician or ophthalmologist) and service agencies, by the relative of a satisfied client, or by the clients themselves.

Most visual aids are supplied free for subjects under 36 years old, particularly for subjects whose rehabilitation will return them to gainful employment or permit them to return to a regular or vocational school. This includes all aids, whether they be typewriters, reading/talking books, or other devices such as closed circuit televisions and projectors or magnifiers.

The "team" concept is stressed as the fundamental key to success. The loss of vision is often a traumatic psychological event. Whether the patient will accept the handicap and be motivated to explore the possibility of rehabilitation is always the first question. He or she can just as easily sink into a deep depression, becoming an even greater burden to family and society.

The family physician, optometrist or local community agency may all be involved and referral to a low vision facility would be expected. If the patient accepts this suggestion, there is no problem. But if he/she refuses, a psychologist, social worker or clergyman may be called upon in order to convince the patient that it is in his or her best interest to seek the low vision services.

The first professional one meets at the facility will be the secretary, a social worker who receives the subject and records the history, i.e. the medical and social background. From this, a preliminary assessment of the patient's needs is made; e.g. is the basic need primarily a visual one, one of mobility or one of communication? Are the patient's desires to get around, to read and communicate? Do they include activities such as T.V., theatre, etc? What are the basic living needs — kitchen, care of self, clothes etc.? There are 1,000 behaviours listed.

In all facilities, the *vision* services are under the direction of an **optometrist**, who will determine the visual status (having on hand the ophthalmological report as to the nature of the pathology, the prognosis and any medical care indicated), and who will indicate the types of visual aids likely to best meet the patient's desires, e.g. to read bus numbers, street names; to read the newspaper; sew, crochet; to play cards or table games; other crafts. A basic message in the care of the low vision patient becomes clearer: we must distinguish *visual* needs from the patient's *desires*, and not try to impose criteria imposed with normally-sighted patients. For example, visually, two persons may have an identical condition, but one wishes to read the newspaper; the other wants to watch T.V. They cannot be handled in the same manner.

A **trained technician** will work with the patient to determine which visual aids, e.g. glasses, telescopes, microscopes, alone or in combination with non-visual aids, e.g. book stands, illuminators, magnifiers, will best satisfy the patient's requirements and desires. Upon approval by the optometrist, the technician will provide training in the use and care of the device or devices. It must be noted that prescribing a device is not necessarily a criterion of success. Not only must the patient know *how* to use it, he or she must actually make regular use of it.

There are several reasons which may explain why a well-prescribed aid is not used. It could be, for

example, a case of self-consciousness, the appearance of the device itself, pride or some other psychological or personality-motivated apprehension. Thus, the **psychologist** or **social worker** becomes involved in many cases.

Althouth the purpose of the total rehabilitation process is to make the patient as independent and as self-sufficient as possible, there are outside factors to consider as well. Will the patient's family accept a return to the home environment? Will the patient, for that matter, accept to go home, or opt to live alone in an apartment? Will the patient actually be self-menacing by choosing to live alone? Again, the social worker or psychologist may be called upon to help solve these problems.

The best rehabilitation of vision does not *ipso facto* make a person mobile. Field restrictions may require the use of a cane, a guide dog, or some form of electronic sensor. In such cases, the patient may require the service of an **orientation and mobility professional**, who will prepare a programme appropriate to the age, physical condition, general health and living conditions of the individual, tailored as much as possible to his/her expectations. A first step, for example, is to evaluate the degree of mobility the patient has acquired (or not acquired) prior to entering the low vision facility. The patient is encouraged to demonstrate his/her determination, and any allusions to helpful devices, canes, telescopes, etc., are avoided at this stage. The actual training will be undertaken later by O&M technicians and covers such aspects as the use of canes as feelers, mobility training in both dark and lighted environments, indoors and out; navigating stairs, corridors, doors; visits to supermarkets, making change, attending to personal care and dress, including basic kitchen functions.

The time spent in training the patient in orientation and mobility will vary with personality, motivation and, perhaps surprisingly, age of the patient. The initiative of the O&M technician comes greatly into play in creating activities which are stimulating enough to the patient to spur the desire to become more effective and self-confident.

But it is not only to optimize

Concluded P. 15

Fig. 1

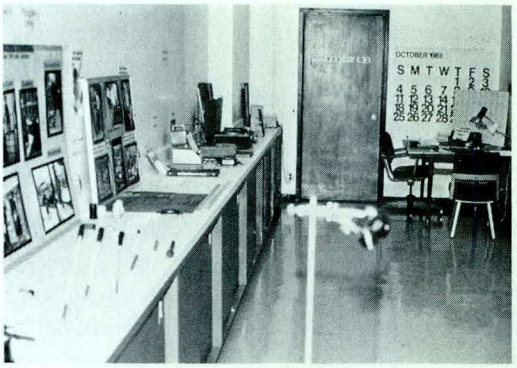

Fig. 2

Fig. 3

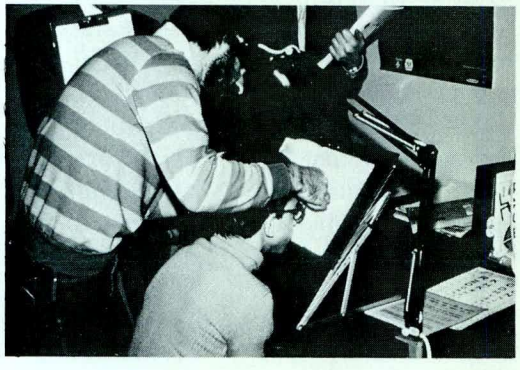

Fig. 4

Figures 1, 2, 3, 4: Photographs taken during the C.A.O. Low Vision Committee's January tour of the Institut Nazareth et Louis Braille and the Montreal Association for the Blind (see accompanying article). Vision services in all three major low vision centres in Quebec, the third being the Institut Louis Hebert in Quebec City, are directed by optometrists using a co-operative, professional team approach to total patient care.

EDITORIAL

A Short Story about an Ad!

Co-operation, mutual trust and respect among health care disciplines are essential ingredients to an efficient, effective, universal and comprehensive health care delivery system in Canada.

The fulfillment of such a commitment by all health care disciplines, from the most exalted to the most humble, is a responsibility that all practitioners in all professions owe to the Canadian society which has educated them and provided them with the physical environment in which they may practice honourably and reap the satisfaction and remuneration attendant on their efforts.

Any willful activity which hinders the attainment of the above stated objective is to be condemned as anti-social and unprofessional conduct, not to say unconsionable and irresponsible because health care professionals, to live up to their professional responsibilities, must place patient interests above personal and professional interests.

Mutual trust and respect cannot be legislated. They must derive from a deep, honest and sincere attitude based on the self-evident principle that no one individual or discipline has a monopoly on intelligence and knowledge.

Any unbiased observer of the social scene knows that knowledge in any one profession was *not* the result of the efforts solely of the members of that discipline; that several independent sciences contributed to its pool of knowledge. Where would medicine be today were it not for anatomists, biologists, chemists and biochemists, not to mention bio-engineers? Where would optometry be today without its heritage in physical and geometrical optics as well as the anatomy and physiology of vision and perception? What kind of engineer would we see today without physics, mechanics and mathematics? Only the *arrogant and narrow minded* refuse to accept that others can contribute to their pool of knowledge, or that others are capable of rendering adequate health care.

Any person accustomed to rubbing shoulders with scientists from other disciplines is aware that the greatest names are the most humble, the most approachable and the first to acknowledge the contributions of others to their fund of knowledge, whether it be from members of their own calling or from sister disciplines. The late Dr. Wilder Penfield of Montreal, and Dr. Montague Ruben of London are outstanding examples of such humble, but great human intellects. Drs. Ted Fisher, Emerson Woodruff, Glenn Fry, Henry Hofstetter and Meredith Morgan are similar examples in optometry.

Great minds do not usually go around deprecating the knowledge of others who are not of their calling. Their experience, their appreciation of human endeavour and their honesty tell them that no one is infallible, that their own fund of knowledge has borrowed extensively from all basic sciences. Finally, they are aware that what differentiates the various professions is not so much *what* they study at the undergraduate level but *how* they apply their knowledge to the solution of human ailments and bodily weaknesses.

Readers must be asking: to what is this long philosophical and moralistic dissertation leading? Simply to a short story about an ad.

In the Fall of 1981, the Alberta Optometric Association sponsored a symposium on children's vision which would feature three optometric educators. An invitation to members of the medical profession was prepared and published in the Journal of the Canadian Medical Association as a full page *paid* advertisement.

A number of ophthalmologists (we understand less than ten) took exception to the ad and protested to the Director of Publications of the Canadian Medical Association. The President of the Canadian Ophthalmological Society wrote a letter to the editor which appeared in the January 15th, 1982 issue of the C.M.A. Journal. By any objective standard, this letter is unworthy of any incumbent of the office of President of the Canadian Ophthalmological Society. It serves rather to reveal a paranoid attitude on the part of a few ophthalmologists and to create distrust between the family physician and the optometrist at the local level, thereby reducing the availability of health services and hindering health care delivery.

The office of President of the Canadian Ophthalmological Society is a position of trust and leadership which carries with it a grave social responsibility to enhance the "team concept in vision care", a concept cherished for years by medical leaders. It is an irresponsible action to use the office of President to attempt to destroy and disparage legally recognized and university-trained professionals. One could have expected more from a responsible officer of COS than to debase the occupational designations of Department Directors in University Schools of Optometry; than to reiterate unfounded accusations, indicative of ignorance on his part, of the expertise of the faculty in optometric institutions and the quality of the training dispensed in these schools; than attempting to scare all family physicians into referring all cases of eye and vision care to the ophthalmologist and listing the alleged dire consequences of seeking optometric care.

This puerile tirade would have passed unnoticed, buried as it was

among letters to the editor, had it not been for the contents of the Publisher's Page (editorial page) of the February 1 issue of the CMAJ. Willingly or unwillingly (we suspect the latter), the editor apologized to the C.O.S. for having accepted an optometric advertisement in a medical journal. What a terrible crime, particularly when the advertisement was an invitation to share knowledge. As the Lafontaine fable says, "Sa peccadille fut jugée un cas pendable"!

Unfortunately, this same editorial contained some blatant misstatements concerning the Optometry part of the Ontario Health Disciplines Act granting optometrists the right to "prescribe drugs" and not obliging them to refer patients suffering from conditions requiring medical attention.

Dr. Irving Baker, Registrar of the College of Optometrists of Ontario, responded quickly to correct these blatant errors but his letter, although published, was not given the same prominent attention such a major editorial lapse demanded. Dr. Roy Brown, Chairman of the Interprofessional Relations Committee of the C.A.O., also responded to both the letter from the President of C.O.S., and to the errors of the editorial page. It was not published, likely because to do so would have been an acknowledgement of the smallness of the individuals concerned.

Is it possible that the great medical profession as represented by the Canadian Medical Association and the Canadian Ophthalmological Society do not have the humility of an exalted discipline and choose to censor the knowledge available to its practitioners?

Is it possible there is a fear of exposing the family physician to optometric knowledge, lest he discover that ophthalmology does not have a monopoly on the care of human vision?

The advertisement itself is insignificant but the reaction to it revealed the fact that right or wrong, the medical fraternity is bigger and more important that the truth!

Truly, a sad day in the annals of medicine!

G.M.B.

Belanger from P. 13

remaining vision or to teach patients to get around that these low vision programmes exist. Communications skills must also be attended to. There is always a desire to get back into the work force, to attend school, etc. and teaching a patient to read, to engage in crafts, even to play the piano are important factors in restoring the individual to a full and satisfying life. So enter the **occupational therapist**, the **reading teacher**, the **communications instructor**.

This latter person, particularly, will provide assistance in learning to write with, for example, felt pens, heavy lines on paper, typewriters, masks, increased illumination etc. For those with no central vision, or with vision which is not amenable to optical aids, there are talking calculators (desk and pocket size), talking watches and the *Optacon*, an electronic sensor which transforms print into electronic impulses to stimulate the finger tip. These impulses have the same shape as the print, and can be used for any print or language. Another device is the *Versa Braille* which can transform Braille to print or print to Braille. Also available are book tapes, reading machines, tape recorders, both regular and variable-speed 4-track, as well as closed-circuit T.V. units which can magnify as much as 60X.

Each of the facilities has a special section devoted to infant care. There is a pre-school day centre, which will accept infants as young as three months, even the multiply-handicapped child. (The mentally-handicapped cannot be diagnosed at this age.)

Parents are involved at this stage and are instructed in techniques of helping the child to be kept at home and to enter the mainstream environment. At a very young age, the detrimental effects of various handicaps on normal development are minimized. Enter the **child development specialist,** the **counsellor** to the parents, the **occupational and physical therapist**, not to omit the **teacher** for children of school age.

The Institut and the Association have facilities for school-aged children in 6-9, 9-12 age groups as outpatients, but they also have residences for those living too far to commute daily. Here again, all professionals are required to assist the teachers in providing education.

Throughout the months of training, consultations are maintained with the subject's physician or physician-specialist, such as the ophthalmologist.

Once the patient has been discharged, follow-up services are available. The social worker or the O&M professional will accompany the patient to his home environment to counsel both patient and family. Subsequent visits will be made as required to monitor progress or to remedy problems which may not have been foreseen, or new ones arising from changes in the home environment, the home itself, or family members caring for the patient.

Again and again the message emerges: low vision services *cannot* be effective if attention is paid *only* to the vision aspect. The whole team of professionals is essential to success. The contribution of optometrists, however, is vital. It cannot be overemphasized and appears to be the key to true success. This is evident from a comparison with services in the remainder of Canada to those in Quebec, where optometrists are part and parcel of the operation.

All other provinces would do well to copy the operation and structure of the Province of Quebec in the provision of its low vision services.

G.M. Belanger

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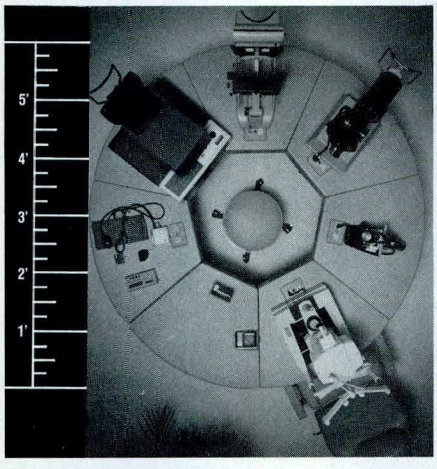

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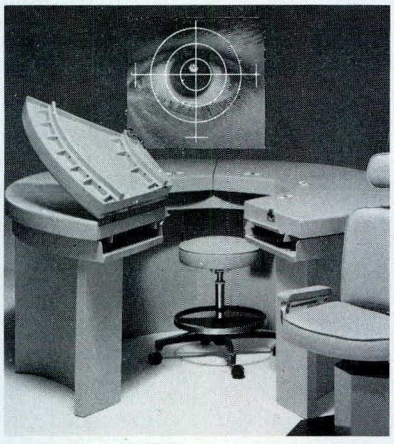

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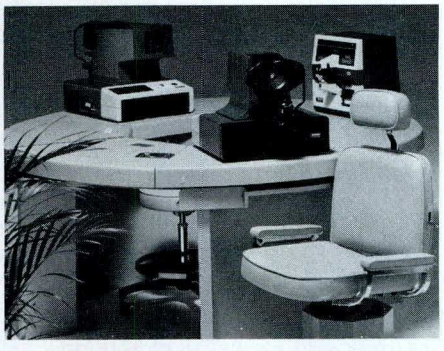

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Optimum Time Constants For The Swinging Flashlight Test: a quantitative study

A. Gene Edworthy*
T. David Williams**

Abstract

The swinging flashlight test has been used for years in optometric practice to determine the integrity of the afferent visual pathways. This paper is an attempt to quantify the duration of the stimulus directed into the eye and the rate at which the stimulus should be alternated between the eyes.

Abrégé

Le test de "Lumière alternante" est employé depuis des années par le practicien pour assurer l'integrité des voies visuelles afférentes. Ce travail est un essai de spécifier la durée du stimulus dans l'oeil et le rythme avec lequel on doit alterner la lumière entre les deux yeux.

Introduction

The swinging flashlight test is used to determine the integrity of the optic nerve anterior to the lateral geniculate body. Various authors have discussed the test in the literature[1,2,3,4], however, no research has been done to determine the optimum parameters which should be used to maximize its diagnostic potential. Even in healthy patients, the natural variance in pupil size may make the assessment of the anterior visual arc difficult. The purpose of this study is to determine, for the healthy visual system, the length of time that the light should be directed at each eye and the speed at which the light should be moved between the two eyes to provide the minimum variance in pupil size.

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Literature Review

The swinging flashlight test was first reported in the literature by Levatin[1] in 1959. Prior to this time, a variation of the test was used to determine the presence of optic neuritis. This test involved directing a light at both eyes simultaneously and alternately shading each eye with the practitioner's hand while watching the illuminated eye[2]. By refining the "Marcus Gunn Test" with the use of a flashlight the sensitivity and accuracy was substantially increased[1].

The pseudo-anisocoria test was developed from the swinging flashlight test by Kestenbaum[2]. During this test the flashlight is held on one eye until the pupil stabilizes. A pupil measurement is then taken and the light is directed at the other eye where the procedure is repeated. If a difference in pupil size becomes manifest, the anterior visual arc of the eye with the larger pupil is damaged. This test has certain disadvantages in that accurate measurements may be difficult if the iris is dark, and subtle changes in pupil sizes may not be detected.

Thompson[3] was the first author to define specific parameters to use with the swinging flashlight test. He provides a comprehensive set of "suggestions and cautionary hints" which are valuable to the practitioner who wants to get the most information possible from the test. Thompson suggests that the light be directed at each eye for 3 to 5 seconds and moved across the nose as quickly as possible. He states that if the light is swung too fast (approximately once per second) a sinusoidal oscillation will be set up which can hamper the interpretation of the pupil reaction. Thompson provides no research to support his suggestion which apparently is based on personal clinical observation.

Kleinstein[4] suggests that the light should be moved alternately from one eye to the other at a rate of 2 seconds per eye. Again, this appears to be based on personal experience as no experimental data were provided to support his suggestions.

Method and Apparatus

The two parameters which were studied in this experiment were the length of time that the light should be held on each eye and the speed that the light should be moved from one eye to the other.

The apparatus was designed to provide complete control over these variables. In order to accomplish this, two 6 mm diameter fiber optic bundles were used to simulate the flashlight. These were positioned symmetrically in front of and slightly inferior to the subject's eyes. A 25 watt 120 volt incandescent bulb was mounted in a container at the other end of the fiber optic bundle and was wired into a Commodore Pet 2001

microprocessor computer. The computer was programmed to turn on one light for 5 seconds, then turn it off and turn on the other light for 5 seconds. The interval between when one light is turned off and the other is turned on (off-time) could be varied to simulate the swing of the flashlight from one eye to the other. During each run, the off-time was constant and each light was turned on 4 times.

A Polymetric series 1163 infrared pupillometer was used to assess the diameter of the right pupil during the run. The pupillometer had input to the computer and provided it with approximately 50 pupil measurements per second. These measurements were made during both consensual and direct stimulation of the right pupil. Thus, for a given experimental run, the right pupil was stimulated directly 4 times (each time for 5 sec.), and consensually 4 times (each time for 5 sec.) The number of pupil measurements accumulated in the computer for each run was then (4 x 5 x 50) + (4 x 5 x 50) = 2000.

The computer was programmed to collect pupil values for each second of the on-time separately: in this way it was possible to examine pupil variability on a second-by-second basis. The mean, variance and standard deviation of pupil size for each second were thus determined.

Thirteen subjects were studied in this experiment. Four runs were made with each subject, using different off-times (0.00 sec., 0.04 sec., 0.14 sec. and 0.50 sec.) for each run. The first off-time (0.00 sec.) was used to simulate instantaneously moving the flashlight from one eye to the other. The largest off-time (0.50 sec.) was chosen because it simulates a relatively slow swing between the two eyes. The other times were chosen so that there was a constant interval of 0.5 log seconds separating each off-time from the next.

Results

Table 1 shows the cumulated data of the study. The variance of the pupil diameter is used as a measure of pupil activity. Figure 1 is a plot of pupil variance as a function of the on-time of the light. The variance was largest within the first second of on-time for all four off-time intervals. From the second to the fifth second, the variance fluctuated somewhat but remained considerably lower than in the first second. It can also be seen that the runs which had an off-time of zero or 0.50 sec. have the largest variance. The runs which had an off-time of 0.14 sec. had the least variance.

To determine whether the length of the on-time had a significant effect on the pupil variance, Hartley's test was employed (see Table V and VI). In Fig. 1, using a significance level of 0.05, a significant difference was found between the variances of the 5 seconds for all four off-times. More

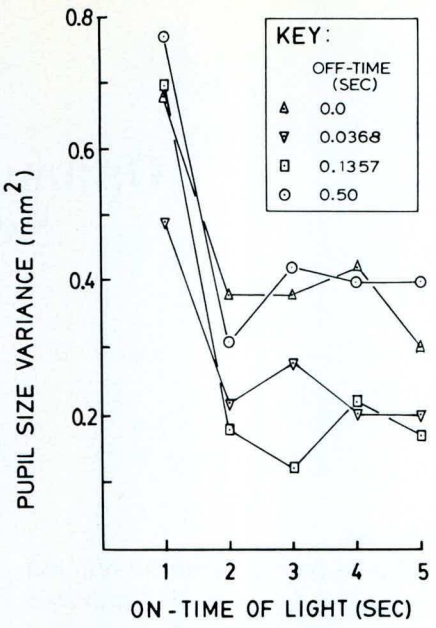

Fig. 1

TABLE 1

No Interval N =13

Sec.	$\bar{X}$ (mm)	Variance (mm²)	Standard Deviation (mm)
1	4.748	0.684	0.827
2	4.734	0.376	0.613
3	4.954	0.381	0.617
4	4.982	0.422	0.650
5	5.109	0.304	0.551

Interval = 0.0368 sec. N = 13

Sec.	$\bar{X}$ (mm)	Variance (mm²)	Standard Deviation (mm)
1	4.349	0.489	0.706
2	4.323	0.220	0.469
3	4.522	0.282	0.531
4	4.546	0.203	0.451
5	4.590	0.199	0.446

Interval = 0.1357 sec. N =13

Sec.	$\bar{X}$ (mm)	Variance (mm²)	Standard Deviation (mm)
1	4.248	0.700	0.837
2	4.301	0.177	0.421
3	4.466	0.118	0.343
4	4.487	0.219	0.468
5	4.563	0.174	0.417

Interval = 0.50 sec. N = 13

Sec.	$\bar{X}$ (mm)	Variance (mm²)	Standard Deviation (mm)
1	4.339	0.767	0.876
2	4.329	0.313	0.559
3	4.416	0.422	0.650
4	4.522	0.391	0.625
5	4.572	0.399	0.632

detailed analyses revealed that for all four curves, there is a significant difference between the pupil variance found in the first second and the variance found in the second second. However, no significant difference was found among the variances for the second, third, fourth or fifth second of on-time.

Figure 2 is a plot of the pupil variance against the off-time for each second of the run. The first second again shows the largest variance. The other four seconds again show lower, somewhat fluctuating pupil size variance. The variance found in the last 4 seconds decreased as the off-time increased until an off-time of 0.14 seconds was reached. The variance then increased as the off-time increased beyond this interval.

Hartley's test was again employed to determine if a significant difference existed between the variance found with the four different off-times (see Table IV). The differences were not found to be significant except in the third second of on-time. Here, the variance found when the off-time was 0.14 sec. was significantly lower than the variance found using the other off-times. The experimental data were analyzed a second time; this time treating the variances as though they were actual data points and thus reducing the degrees of freedom associated with the number of observations from infinity to 3 and 4 for the off-time and the on-time respectively (Table VII).

For this analysis the average pupil size variance for each second of on-time was found without regard to the length of the off-time interval. This was done by averaging together all of the variances that were found using a specific length of on-time. For example, the variance that was found during the first second of on-time when the off-time interval was 0.00 sec., was averaged together with the variances that were found during the first second of on-time when the 3 other off-time intervals were used. The analysis showed a significant difference in the pupil size variance between the 5 consecutive seconds of on-time.

To analyse the average variance for each off-time interval without regard to the length of the on-time, the variances found during all 5 seconds of on-time that were obtained using a specific off-time were averaged together. Using the sum of squares analysis and treating the calculated variances found in Table I as though they were raw data, a significant difference in the variances was found between the 4 off-time intervals.

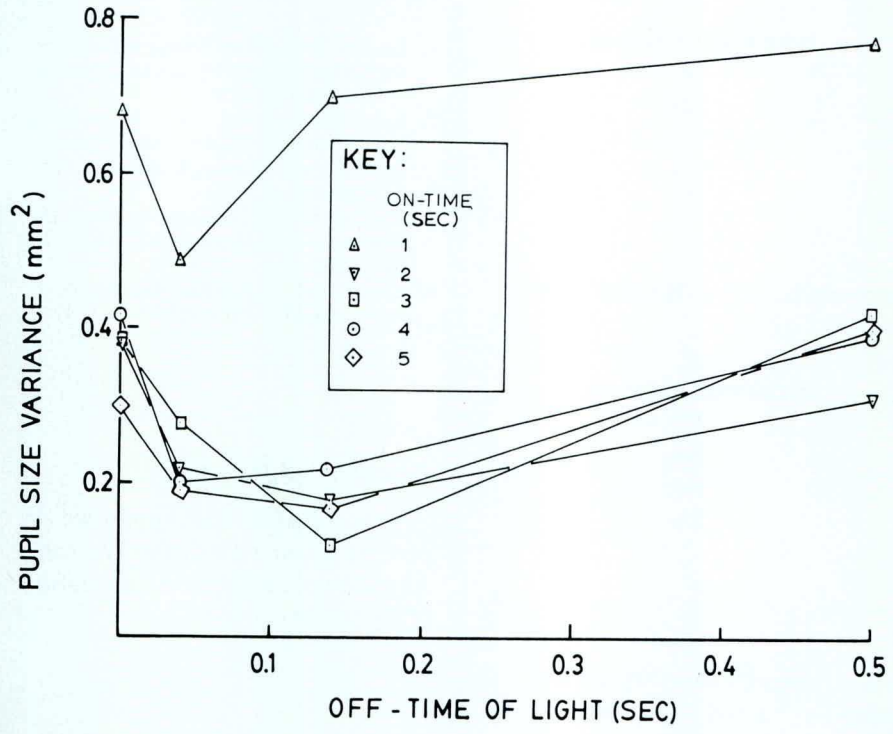

Fig. 2

Discussion

The results of this experiment indicate that both of the parameters studied have an effect on the variance of the pupil size. Of the two, the length of time that the light is held on each eye appears to be the more important. The pupil size normally fluctuates more during the first second of direct or consensual light stimulation than it does during subsequent stimulation. This difference in pupil size variance is statistically significant. The clinical significance can be seen when it is realized that during the first second the pupil will fluctuate by more than 1.6 mm for 30% of the time it is observed. When the light was held on the eye for at least 2 seconds the fluctuation can be reduced by approximately 0.6 mm.

The experimental results also indicate that the pupil variance tends to be minimized when an off-time interval of approximately 0.14 seconds is used. This simulates a moderately fast swing between the two eyes. The highest pupil size fluctuation was found when a slow swing of 0.50 sec. was simulated. The differences in pupil size variance that are based on the differences in the simulated speed of the flashlight swing were not highly significant statistically or clinically. Maintaining a swing of 0.14 seconds reduced the standard deviation of the pupil size by only 0.2 mm when compared with a swing of 0.50 seconds. This means that when a 0.14 second off-time is used with an on-time of 2 seconds or more, 68% of the time the pupil size will not fluctuate more than ± 0.40 mm. When a 0.50 second off-time is used with an on-time of 2 seconds or more, the pupil size will fluctuate within ± 0.60 mm 68% of the time. This small difference will

TABLE II All off-times averaged together

Sec.	$\bar{X}$ (mm)	Variance (mm^2)	Standard Deviation (mm)
1	4.421	0.660	0.811
2	4.422	0.271	0.515
3	4.589	0.301	0.535
4	4.634	0.309	0.548
5	4.708	0.269	0.511

TABLE III All on-times averaged together for on-time $\geq$ 2 sec.

off time interval	$\bar{X}$ (mm)	Variance (mm^2)	Standard Deviation (mm)	Standard Deviation (mm)
0.00	4.905	0.433	0.652	0.608
0.04	4.466	0.279	0.521	0.474
0.14	4.413	0.278	0.497	0.412
0.50	4.436	0.458	0.668	0.616

TABLE IV Analysis of off-time-Hartley's test

on time		$F_{4,\infty}$ (0.05)	
Sec.	Fmax	F score needed	Significant Difference
1	1.57	2.37	No
2	2.12	2.37	No
3	3.58	2.37	Yes
4	2.08	2.37	No
5	2.29	2.37	No

TABLE V Analysis of on-time effect — All 5 seconds — Hartley's test

Off time		$F_{5,\infty}$ (0.05)	
Interval	Fmax	F score needed	Significant Difference
0.00	2.25	2.21	Yes
0.04	2.46	2.21	Yes
0.14	5.93	2.21	Yes
0.50	2.45	2.21	Yes

TABLE VI Analysis of on-time effect-seconds 2,3,4,5 — Hartley's test

Off time		$F_{4,\infty}$ (0.05)	
Interval	Fmax	F score needed	Significant Difference
0.00	1.39	2.37	No
0.04	1.42	2.37	No
0.14	1.86	2.37	No
0.50	1.35	2.37	No

TABLE VII Sum of squares analysis

	Degrees of Freedom	Sum of Squares	F score needed	Significance Level	Significant Difference
On-time	4	0.4489	26.66	0.0001	Yes
Off-time	3	0.1423	11.27	0.0008	Yes

not likely affect the outcome of an optic nerve assessment.

Conclusions

On-Time This study indicates that when using the swinging flashlight test, the light should be directed at each eye for at least two seconds. Longer stimulation does not significantly affect the variance in pupil size. Conversely, stimulation of less than 2 seconds is associated with considerable pupil instability in normal subjects. Stimulation of less than 2 seconds would likely reduce the value of this test in abnormal subjects as well.

Off-Time An off-time of 0.5 seconds is associated with considerable pupil variance during the first second of stimulation. Ideally, an off-time of 0.14 seconds would further reduce pupil variance when on-times of 2 seconds or more are considered. However, the reduction associated with an ideally timed swing is not highly significant clinically.

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Acknowledgement

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CANADIAN OPTOMETRIC CONTACT LENS SOCIETY
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The CALS Lens: Optical and Perceptual Considerations in Aspheric Topography

Thomas C. Evans*

Abstract

When aspheric surfaces are applied to the eye in the form of contact lenses, both optical and perceptual factors must be considered in vivo. Various clinical and theoretical articles are reviewed and limits established for perceptual factors such as tolerance to retinal defocus in the normally aberrated eye. The range of asphericity (k) and eccentricity (e) required to optically correct for presbyopia and astigmatism is predicted for given pupillary radii. The topography of the CALS aspheric front surface is shown to be within the predicted range. Several factors of fitting and lens design are discussed with respect to a previous clinical study of the CALS soft lens.

Abrégé

L'utilisation d'une lentille contact à surfaces asphériques exige la considération de facteurs tant optiques que perceptuels. Ce travail examine certains articles cliniques et théoriques ayant servis à l'établissement de limites pour ces facteurs perceptuels tel la tolérance d'une image retinienne brouillée dans un oeil normal mais ayant les aberrations usuelles. Le degré d'asphéricité et d'excentricité requis pour la correction de la presbytie et l'astigmatisme, est prédit pour des diamètres determinés de la pupille. La topographie de la surface antérieure de la lentille CALS est démontrée comme étant dans les limites prédites. On discute certains aspects des parmètres et de l'ajustement en marge d'une étude antérieure de cette lentille.

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Kaplan[1] proposed an aplanatic hard contact lens with a front paraboloid surface which theoretically corrected for spherical aberration. He theorized that spherical aberration was the major contributor of Seidel's aberrations to the circle of least confusion on the retina. This aplanatic contact lens, Kaplan postulated, improved the visual performance of the eye by creating an optical system where the size of the disc of confusion for distance fixation equals that for near fixation. This new optical system limited the size of the disc of confusion, presbyopia and astigmatism not withstanding. Kaplan[2,3] further stated that the limit of visual resolution was defined more by the separation and neural organization of the retinal receptors and visual pathways than by the quality of the retinal image.

Remole[4] discussed the resolution limit of the receptor mechanism in terms of spatial frequency versus border enhancement and its effect on sensitivity to retinal defocus. The conclusions indicated that the receptor mechanism functioned in the near-focus (minimal defocus) range of ±0.50 D. by interacting with the effects of spherical aberration to decrease sensitivity to retinal defocus. This range was explained if the spatial frequency threshold depended more upon the central maximum intensity than the total diameter or spread of the blur circle. These results described a blur circle tolerance in the human visual system mediated by the receptor mechanism of approximately 1.00 D.

Reduction of blur circle size or changes in the intensity distribution within the blur circle itself alters visual resolution. Wichterle[5] theorized an optical model wherein this intensity distribution at the retinal level was centrally maximized by aspheric contact lenses. Assuming a diffraction limited optical system, he predicted that spin cast back aspheres (which vary from .7 to .9 in eccentricity) in effect extended accommodation or retinal defocus by 0.50 to 1.00 D. without any damage to image sharpness. Further, Wichterle suggested, that production of front aspheres would extend the range of eccentricities and the dioptric effects achievable.

Hard contact lenses which employed aspheric curves were investigated by Goldberg[6] (VFL1 and VFL2 lenses) and Kerns[7] (Neefe's Panofocal lens). These hard lenses have been produced in front, back and biaspheric forms. Most investigators[1,2,5,6,7] have agreed that elliptical, parabolic and hyperbolic eccentricities were of theoretical value in compensating for residual astigmatism, presbyopia and aphakia respectively. Kerns[7] clinically investigated the Panofocal lens and found that this front aspheric (elliptical) hard lens significantly increased visual acuity and efficiency over a spherical hard lens in cases of residual astigmatism of 0.50 to 1.75 D.

Bauer[8] investigated the longitudinal spherical aberration of soft contact lenses by comparing Bausch & Lomb spin-cast (elliptical base curve) to lathe-cut (spherical base curve) polymacon lenses. The spherical aberration of the spin-cast soft lenses was significantly smaller than

that of lathe-cut lenses in air but was dependent on back vertex power and also varied with lens series (U_3 and U_4). The maximum spherical aberration tolerable by the visual system was theoretically calculated and clinically investigated to be approximately 0.25 to 0.75 D. at a 2 to 3 mm. pupil radius. These values were chosen because at pupillary radii less than 2.0 mm. diffraction was the major factor controlling resolution and at lower levels of illuminance or radii greater than 3.0 mm., visual acuity decreases and the eye can tolerate rather large aberrations.[8]

Campbell[9] commenting on Bauer's study, pointed out that once the contact lens is placed on the eye it is the characteristics of the front surface (and not the base curve) which determine the spherical aberration of the eye - lens optical system. This is obvious because of the significantly larger differential in refractive indices at the air - lens interface compared to the lens-tear interface.[9] There were two additional limitations of a back aspheric contact lens. Firstly since the aberration characteristics of spin cast lenses were dependent on back vertex power and varied with series (U_3 and U_4),[8] this then imposed limitations in providing the best fit and/or vertex power for the eye. Secondly, according to Wichterle,[5] the amount of eccentricity achievable with spin cast back aspheres, even in air, was limited and could only be increased by the addition of a front aspheric surface.

Consideration of the optical limitations of the eye - contact lens system by diffraction and spherical aberration and the perceptual characteristics exhibited by the receptor mechanism led to the development of the CALS soft lens (a front asphere with a spherical base curve). The topography of the CALS front surface was developed empirically in accordance with production techniques. The clinical effectivity of the CALS lens has been demonstrated in a recent study.[10] This effect may be understood if, as suggested by Remole[4], there is a 1.00 D. (±0.50) range of desensitivity of retinal defocus (blur circle tolerance) in the aberrated visual system. Bauer[8] accounted for 0.25 to 0.75 D. of this range as tolerance to spherical aberration. Wichterle[5] and Bauer[8] concluded that back aspheric contact lenses exhibited reduced spherical aberration in air. Furthermore, Wichterle[5] suggested that the eccentricity of a contact lens can be modified to correct for optical aberrations beyond the amount achievable with spin cast back aspheres by increasing the eccentricity of the front surface to result in eccentricity values of e >.9. If the CALS soft lens corrects the eye for its optical defects, both ammetropic and aberrated, then the 1.00 D. range of blur circle tolerance may be utilized and extended by variations in eccentricity to correct for presbyopia and astigmatism. The author's explanation of CALS clinical effects[10] (unlike the Wichterle model[5]) assumes some residual accomodation on the part of the eye to aid centration (with respect to the retinal plane) of the zone of clear vision thus created.

It is the purpose of this article to describe CALS lens topography in terms of its asphericity (k) and its eccentricity (e) and to show these values to be within the theoretical range suggested by the various authors reviewed to be effective in correcting the eye-lens optical system for diffraction and spherical aberration. Emphasis is given in the discussion to aperture radii of 1.5 to 3.5 mm. which expands the range suggested by Bauer[8] to include an area in the diffraction limited pupillary zone. The topography of the entire optic zone is presented as is a discussion of various factors of fitting and lens design and their effect on eccentricity.

Methods and Calculations

The front suface of a CALS lens is lathe-cut and is defined by an equation which describes an aspheric locus of points in polar coordinates[11].

$$\rho = r_0 + kr_0 \left(\frac{1 - \cos\theta}{1 + \cos\theta}\right) \quad (1)$$

which can be written

$$\rho = r_0 + \Delta r_0 \quad (2)$$

where $\Delta r_0 = kr_0 \left(\frac{1 - \cos\theta}{1 + \cos\theta}\right)$

r_0 = central radius of a spherical surface when θ = zero

k = an asphericity constant

θ = the angular sub tence of ρ with the x-axis

ρ = the distance between the focus and a point on the curve (see figure 1)

Bennett[12,13] discusses a formula which may be used to calculate the eccentricity of a conic section.

$$p = \frac{2r_0 x - y^2}{x^2} \quad (3)$$

x = sagittal depth of a conic section

r_0 = central radius

$p = 1 - (e)^2$, in which e = eccentricity

y = aperture radius

(see figure 1)

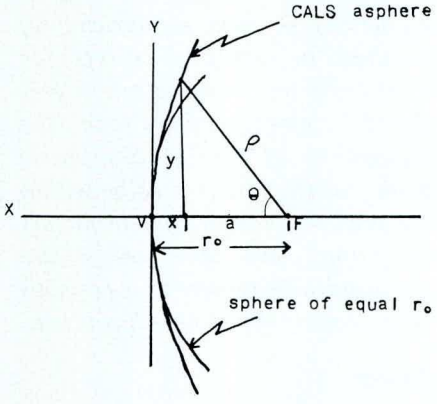

Fig. 1.

A CALS aspheric surface showing its sagittal depth (x).

$a = (\cos\theta)\,\rho \qquad y = (\sin\theta)\,\rho \qquad x = r_0 - a$

$\rho = r_0 + kr_0 \left(\frac{1 - \cos\theta}{1 + \cos\theta}\right)$

The value of ρ can be calculated from equation (1) given θ, k and r_0. Since from figure 1, $a = (\cos\theta)\,\rho$ and $y = (\sin\theta)\,\rho$, then given ρ both a and y may be derived. Since $FV = r_0$ and $x = r_0 - a$, then x can be derived given r_0 and a. Therefore the eccentricity of the CALS asphere can be calculated using equation (3). This mathematical approach describes an aspheric curve as a series of conic sections of equivalent sagittal depth. This method is analogous to the commonly used calculations in optical design which describe a conic section as a series of circles of

Table 1

Values of ρ, k, e, y (aperture radius) and the hydrated radius of the front curve of the CALS lens (r_0 when $\theta = 0$).

r_0 (mm.)	θ degrees	k	ρ (mm.)	y (mm.)	Δr_0 (mm.)*
8.57	35	0.015	8.5828	4.92	0.0128
8.37	35	0.015	8.3825	4.81	0.0125
8.17	35	0.015	8.1822	4.69	0.0122
9.90	35	0.015	9.9148	5.69	0.0148
9.63	35	0.015	9.6444	5.53	0.0144
9.36	35	0.015	9.3740	5.38	0.0140
8.37	35	0.030	8.3950	4.82	0.0250
8.37	35	0.045	8.4074	4.82	0.0374
8.37	35	0.060	8.4199	4.83	0.0499
8.37	35	0.075	8.4324	4.84	0.0624
8.37	25	0.015	8.3762	3.54	0.0062
8.37	20	0.015	8.3739	2.86	0.0039
8.37	15	0.015	8.3722	2.17	0.0022
8.37	10	0.015	8.3710	1.45	0.0010

* $\rho = r_0 + \Delta r_0$ (2) therefore $\Delta r_0 = \rho - r_0$

equivalent sagittal depth and radius.[12,13,14] (see appendix)

Results

Table 1 shows variations in ρ, aperture radius (y), and Δr_0 for constant and varying values of r_0, k and θ. Table 2 demonstrates the effect on eccentricity (e) of variations in θ, k, r_0, base curve and central power (F_0). It can be seen that ρ varies directly with θ, k and r_0. Eccentricity is unaffected by variations in central power, base curve and central radius, but is increased by increasing k or decreasing θ.

Discussion

It must be remembered when discussing numerical values of eccentricity, that with a soft lens which conforms to the corneal curvature the corneal eccentricity is a participant in the resultant or summation eccentricity of the CALS lens on the eye and that the eccentricity of the CALS front surface varies inversely with aperture size.

Table 2 indicates a change in eccentricity (e) with θ. This points out that the CALS front surface is not a conic section, but that its eccentricity increases toward the centre of the lens, as described by equation (1). It is seen from Tables 1 and 2 that Δr_0 with decreasing values of θ reaches the order of magnitude of microns (θ = 10 degrees, y = 1.45mm., r_0 = 8.37mm., Δr_0 = .001mm. = 1 micron, e = 1.0). Thus, the CALS front surface is an aspheric curve resembling (within fractions of microns) the conic sections. Figure 2b demonstrates that the conic sections (circle, ellipse, parabola and hyperbola) are similar in asphericity near the x-axis.

The cornea has been described[6,14] as an aspheric curve resembling an ellipse of between .5 and .6 eccentricity. Holden and Zantos[15] discuss a pattern of three point contact to describe the conformity of soft lenses fitted flatter than the corneal curve: (1) a central area 8 - 9mm. wide; (2) vaulting over the limbus; and (3) contact at the periphery of the lens with the conjunctiva covering the sclera (Figure 2a). The degree of non-conformity of soft lenses fitted in this way was proven to be very small in area (1). Increased lens thickness and decreased water content had the effect of increasing non-conformity.

Only in the case of total non-conformity of the CALS to the corneal curvature could the resultant eccentricities be equal to the values

Table 2

Values of eccentricity (e) calculated for various values of θ, k, r_0, F_0 and B.C.R. F_0 is the hydrated central power. B.C.R. is the hydrated back curve radius. The first six lenses represent the CALS fitting set.

F_0 (D)	B.C.R. (mm)	r_0 (mm)	θ degrees	k	e
+3.00	9.35	8.57	35	0.015	0.30
+3.00	9.10	8.37	35	0.015	0.30
+3.00	8.86	8.17	35	0.015	0.30
-3.00	9.35	9.90	35	0.015	0.30
-3.00	9.10	9.63	35	0.015	0.30
-3.00	8.86	9.36	35	0.015	0.30
+3.00	9.10	8.37	35	0.030	0.43
+3.00	9.10	8.37	35	0.045	0.53
+3.00	9.10	8.37	35	0.060	0.62
+3.00	9.10	8.37	35	0.075	0.70
+3.00	9.10	8.37	25	0.015	0.41
+3.00	9.10	8.37	25	0.030	0.59
+3.00	9.10	8.37	25	0.045	0.73
+3.00	9.10	8.37	25	0.060	0.84
+3.00	9.10	8.37	25	0.075	0.95
+3.00	9.10	8.37	20	0.015	0.51
+3.00	9.10	8.37	15	0.015	0.67
+3.00	9.10	8.37	10	0.015	1.00

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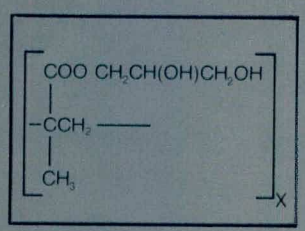
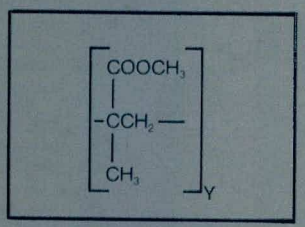


GLYCERYL METHACRYLATE (GMA)



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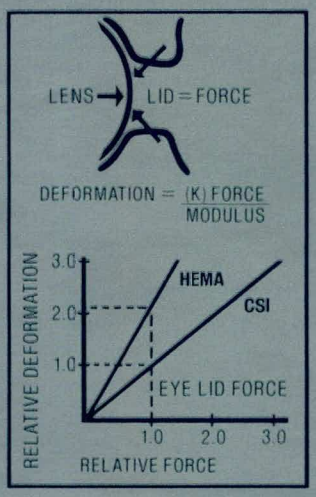

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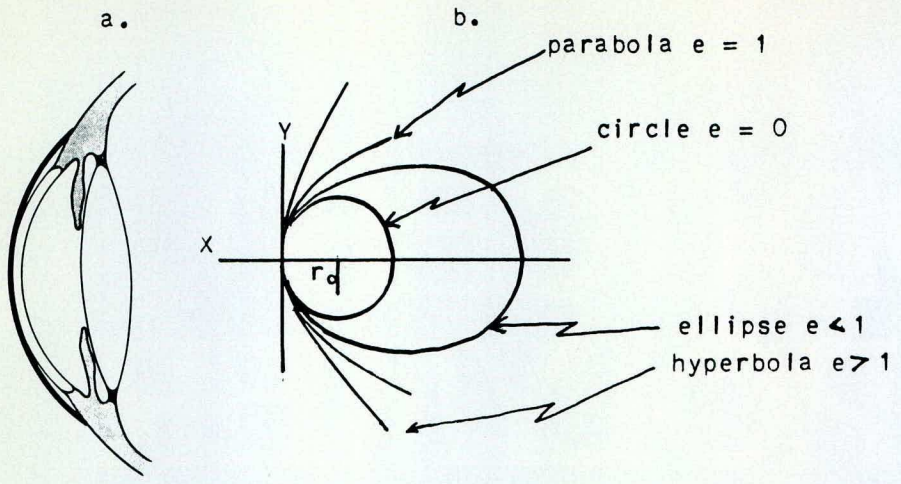

Fig. 2.

a.: Schematic representation of the 3-point contact fitting from Holden [15].

b.: Relationship of conic sections and their similarity near the x-axis having all the same r_0.

calculated in Table 2. In the case of total conformity the resultant eccentricities would be a sum of the corneal and the CALS eccentricities. The final product of this summation remains unknown and theoretically complicated by variability in corneal topography and changes in CALS eccentricity with aperture size. Given, from tables 1 and 2, k = .015, aperture radii less than y = 2.86 mm., e = .51, and assuming a high degree of conformity to corneal curvature (e = .5 to .6), the CALS aspheric front curve in vivo can be reasonably expected to exceed e = .9. At aperture radii less than 1.45 mm., e = 1.0, (again assuming minimal increments in eccentricity due to summation with the host cornea) the eccentricity of the CALS front surface in vivo would be hyperbolic. Interpolation of the Wichterle model[5] predicts that a hyperbolic contact lens (e = 1.2) would in effect extend accommodation or desensitivity to retinal defocus by 1.75 to 2.00 D.

Garner[16] discussed a model for calculation of the sagittal depth of the anterior eye, taking into consideration corneal and scleral asphericity as well as corneal diameter. These calculations indicated that soft lenses fitted on a semi-scleral basis tended to decrease in sagittal depth when applied to the eye and that increasing base curve radius (B.C.R.) decreases the differential between anterior eye and contact lens sagittal depth. It is this differential in sagittal depth which determines the amount and direction of soft lens flexure on the eye. The procedure of increasing B.C.R. until optimal visual acuity is achieved (an established CALS clinical routine[10]) decreases the magnitude of flexure. It is the author's opinion that increasing B.C.R. tends to increase the conformity of the CALS lens to the corneal curvature.

Having discussed variation in B.C.R. the second variable most often considered clinically, is diameter. The major effect of variations in diameter of the CALS lens would be in centration of the lens with respect to the visual system. There is considerable difficulty in assessing the effect on flexure of diameter alone. There are many factors which will act in concert to affect flexure and non-conformity such as diameter, lens thickness and power, water content, peripheral curve design (radius and width), and even lens coating due to tear instability.

The CALS lens has been shown to be successful using a standardized fitting criterion and clinical routine[10] in 85% of cases with k = .015 in presbyopia and/or astigmatism up to 2.00 D. Two cases of altered k values were shown in the appendix of a previous article[10]. Asphericity constants of up to k = .0675 were used to fit up to 4.00 D. of spectacle cylinder successfully. The third case in the appendix deals with more than 20.00 D. of myopia with 2.00 D. of astigmatism successfully fitted using k = .015. This demonstrates that the effect of lens power on flexure seems to clinically require little change in k values. The conclusions reached in the previous article clearly indicate that variations in B.C.R. with standard k = .015 will be effective in the vast majority of cases. The pattern of variation of k (the asphericity constant) given constant B.C.R. values is beyond the scope of this article and is the subject of research in progress.

Conclusions

Values of eccentricity are derived for the CALS front surface which is an asphere of variable eccentricity. Eccentricity increases with increasing values of the asphericity constant k and decreasing aperture radius. At aperture radii from 1.45 to 2.86 mm. the calculated values of eccentricity are within the range theoretically predicted to be effective in controlling the optical aberrations of the eye. It is the author's opinion that increasing B.C.R. increases the conformity to corneal curvature of the CALS lens on the eye. Factors such as diameter, lens power and thickness, water content, peripheral curve design and even lens coating in the eye affect flexure and non-conformity and thus the resultant summation of the lens with corneal eccentricity. These theoretical complexities must be considered within the clinical context. The CALS lens was found to be clinically successful in 85% of cases using standard k values and a relatively non-complex fitting criterion and clinical routine[10].

Appendix

A conic section can be defined geometrically as the locus of a point which moves such that its distance from a given fixed point, the focus, bears a constant ratio to its perpendicular distance from a fixed straight line, the directrix[12]. This ratio is the eccentricity (e). In describing an

optical surface a more relevant approach is to describe eccentricity in terms of sagittal depth and sagittal radius of curvature. The centre of curvature in any sagittal section is the intersection of the normal to the curve (at the point concerned) with the axis[13]. In Figure 3, AG is the sagittal radius at a point A on the curve and at a point B, BH is the sagittal radius. The distances AF and BF are equal to the entity ρ in the polar equation (1) for the CALS asphere. It can be seen from Figure 3 that ρ equals the radius of curvature only when $\theta = 0$ (r_0 = vertex radius). At all other points on an asphere the sagittal radius exceeds ρ and lengthens as the chosen point moves along the asphere from the vertex. By comparing figures 1, 2b and 3 it can be seen that increasing the asphericity constant, k, (equation 1) increases the magnitude of ρ and this has the effect of increasing eccentricity from elliptical ($e<1$) to parabolic ($e = 1$), to hyperbolic ($e > 1$). Bennett[13] developed a formula to calculate the sagittal radius of curvature.

$$r_s = \sqrt{r_0^2 + (1 - p)\, y^2} \quad (4)$$

r_0 = central radius

$p = 1 - (e^2)$

y = aperture radius

Thus given r_0, e and y (which can be derived from equations 1 and 3) the sagittal radii of curvature of the CALS asphere can be calculated. As previously stated, this calculation compares the CALS asphere to a series of conic sections of equivalent sagittal depths and radii.

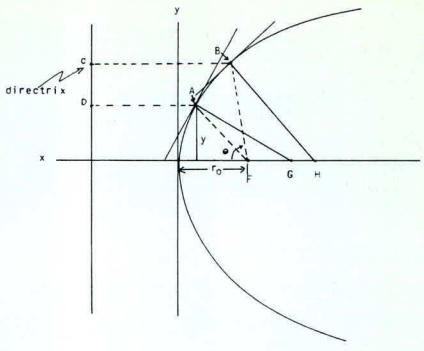

Fig. 3.

A sagittal section of an aspheric surface showing the sagittal radii of curvature at two points on the curve (AG and BH) where $e = \frac{AF}{AD} = \frac{BF}{BC}$ and $\rho_A = AF$, $\rho_B = BF$.

In summary: The eccentricity constant (e) of an aspheric curve is the ratio of ρ to the perpendicular distance from a point on the curve to the directrix. The asphericity constant (k) determines the rate of elongation of ρ resulting in the varying eccentricity of the CALS asphere. These factors in turn determine the rate of elongation of the sagittal radii derived from equation (4). Ultimately, it is this elongation of the radius of curvature which alters the vergence of light passing through the aspheric contact lens to correct the aberration characteristics of the eye-lens system. The eccentricity and asphericity constants are primarily mathematical entities which indirectly determine and describe the rate of change of the radius of curvature of an asphere. For the conic sections this is an accelerating change (with increasing aperture size) but for the CALS aspheric curve there is a relatively constant elongation of the radius of curvature due to the variation in eccentricity.

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Case Report — Ocular Myasthenia Gravis

Rodger Pace*

Abstract

Myasthenia gravis is a chronic disease producing muscle weakness. Ocular muscle involvement occurs in a large percentage of myasthenic patients. A case of myasthenia gravis with initial symptoms of diplopia and extraocular muscle involvement is presented. The ocular signs of myasthenia gravis and diagnostic procedures are emphasized.

Abrégé

Myathénie Gravis est une maladie chronique sérieuse caractérisée par une faiblesse musculaire affectant très souvent les muscles extrinsèques de l'oeil, ce qui entraine diplopie et ptosis. Ce travail décrit les symptômes oculaires et les tests diagnostiques pour cette condition.

Introduction

Myasthenia gravis is a chronic disease characterized by weakness of voluntary muscles following their use. It affects primarily the muscles of facial expression, mastication, swallowing, ocular motility and the eyelids.[1a] Muscle strength returns rapidly after a period of rest. Smooth muscle and cardiac muscle are not affected.[2] There is a failure of neuromuscular transmission, possibly a depletion of acetylcholine or an increased breakdown of acetylcholine due to overactivity of cholinesterase. About 10% of the patients exhibit thymoma and 5% have dysthyroidism.[3a] Ocular muscle involvement occurs in 90% of myasthenics and accounts for the initial complaint in about 75% of the cases.

Approximately 20% of myasthenics exhibit purely ocular involvement and extraocular muscles can be involved individually or in any combination.[3b]

History and Background

Patient E.S. was first examined by the author in 1975 for routine ocular assessment. He was 53 years of age at that time. He was using spectacles for reading only and had no visual complaints. General health history and medication use was negative.

At that time he was found to be a low hyperopic astigmat and presbyope. The refractive status was O.D. +0.75 -0.50 x 030, 20/20; O.S. +0.75 -0.25 x 120, 20/20; add +2.25, 0.37M O.U. This was not significantly different from his habitual correction. Since he preferred not to wear bifocals and unaided vision was O.D. 20/25, O.S. 20/25, O.U. 20/20, he was advised to retain his present reading glasses.

There were no abnormalities of ocular health and ocular motility was normal. Intraocular pressure and visual fields were unremarkable.

E.S. was examined annually for the next two years during which no changes were found. In 1978 there was a slight change in refraction and the following prescription was written: O.D. +1.25 -0.25 x 060, 20/20; O.S. +1.25 -0.50 x 105, 20/20; add +2.25 O.U. Since unaided visual acuities were now O.D. 20/60 and O.S. 20/30, bifocals were advised.

In 1979, E.S. was seen on an emergency basis. He was 57 years old at this time. He reported vertical diplopia on right gaze which had been noticed sporadically for the previous ten days. It had become more troublesome on the day prior to the consultation.

Clinical Findings

No change in refraction or visual acuities was noted. Ophthalmoscopy and external health examinations were unremarkable. Pupils responded normally and there was a negative Marcus-Gunn sign. The three-step method for evaluating ocular deviations revealed the following:

primary position
  12 prism dioptres right hyperdeviation
gaze left
  ortho (i.e. decrease in deviation)
gaze right
  20 prism dioptres right hyper (i.e. increase in deviation)
head tilt left
  hyperdeviation decreased
head tilt right
  hyperdeviation increased

Diagnosis

Analysis of the three-step method would implicate the left inferior oblique as the muscle primarily involved. Telephone consultation with a neuro-ophthalmologist resulted in immediate referral as this type of deviation can be indicative of an ischemic attack of the vertebrobasilar vascular supply or myasthenia gravis.

During the ophthalmological assessment a peculiar twitching of the right upper lid was noted. This was suspected to be Cogan's lid "twitch" sign which is elicited by having the patient rapidly redirect his gaze from downward to the primary position. If the lid appears to twitch upward and then settle back to its original position, myasthenia gravis is suspected.[3c]

A Lancaster red-green test was conducted with Tensilon injected intravenously. This resulted in a decrease in the ocular deviation. Since the Tensilon test is considered diagnostic for myasthenia gravis the patient was referred to a neurologist for definitive diagnosis and treatment.[1b]

Concluded P. 46

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Early Arcus — An Important Alert

Zoltan Rona*
Ned Paige†

Abstract

Soon after being fitted with contact lenses, a 26-year old male who had presented an arcus, developed intolerance to the lenses. A subsequent medical examination which included biochemical tests, confirmed the condition of arcus juvenilis. Comments on the management of such cases are offered.

Abrégé

Peu de temps après avoir reçus ses lentilles contact un jeune mâle de 26 ans qui présentait un arcus, développa une intolérance à ses lentilles. Un examen médical, y inclus des tests bio-chimiques, confirma la présence d'un "arcus juvénile". Les auteurs offrent des commentaires sur le traitement de la condition.

Arcus juvenilis appears as a ring around the corneal margin of the iris, sometimes seen in young persons, but resembling arcus senilis (a white ring around the margin of the cornea, produced by fatty degeneration of, or deposits in, corneal tissue, especially in the aged) (1).

All too often a patient exhibiting arcus juvenilis is questioned as to the existence of diabetes or disturbances of lipid metabolism in the immediate family, and if the answer is in the negative, the condition is dismissed as an anomaly of no significance to the patient's present or future welfare. Unfortunately, nothing could be further from the truth.

Even worse is the situation in which some testing is actually carried out but the tests are inadequate to reveal the underlying systemic malfunctions for which the arcus is providing an alert and the patient is reassured that all is well when this is not the case. A case history may help illustrate the situation.

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Dr. Paige

Mr. R.B., a 26-year-old white male, was fitted with contact lenses in September 1980. During the examination arcus juvenilis and large pupils (7mm) were noted; however, otherwise he appeared a good candidate for contact lenses. He was advised to consult his physician about the arcus and large pupils.

The first fitting of the contact lenses was uneventful and he quickly adapted to all day wearing. A subsequent progress examination revealed what was apparently a sudden increase in myopia, although of low degree in both eyes. The lenses were checked for warpage or base curve changes and it was ascertained that the increase in myopia was a true one not associated with any failure of the contact lenses to hold stability of characteristics. His pupil size at various examinations was noted to vary from 4 to 7mm under the same lighting conditions. He was again advised to see his physician.

On August 5, 1981 Mr. R.B. presented himself with the following complaints: nausea when wearing his contacts or glasses, loss of adaptation to the contacts (maximum wearing time 6-8 hours), the presence of a floater in his right eye for the past month which was annoying him greatly. He didn't look well. He had seen his physician since his last visit to me and nothing of note was found.

On the basis of the above, I decided to refer him to Dr. Rona with a letter describing my findings and an aside that there appeared to be something peculiar going on.

Dr. Rona

I first saw Mr. R.B. on September 18, 1981. At the time, he presented with multiple somatic complaints (fatigue of 9-10 months duration, intermittent nausea, headaches, forgetfulness, weakness of the muscles, indigestion, and trouble with his contact lenses). He had recently been to see a general practitioner who reassured him that there was nothing wrong.

Physical evaluation was within normal limits except for the presence of bilateral arcus juvenilis.

Blood and urine tests, however, revealed the following abnormalities:

1) *Abnormal 6 hour glucose tolerance test:* (2, 3)
   1 + glucose was found in the urine at the 1st hour and the blood glucose dipped to a level of 51 mgs. % at the 3rd hour. Many of the somatic complaints (fatigue, weakness, etc.) were reproduced on this test. The diagnosis was moderately severe reactive hypoglycemia.
2) *Elevated CHD (Coronary Heart Disease) Risk ratio:* (2, 3)
   This is calculated by dividing the value of the total serum cholesterol by the HDL ÷ cholesterol value. In this case it was 221 - 39 = 5.67. The national average CHD risk for a male is 4.9. Any values above 4.9 are considered higher risk, while those below 4.9 are conversely lower risk. Thus, Mr. R.B. had a statistically greater risk of developing a heart attack over the next five years.
3) *Hair mineral analysis imbalances:* (2, 3)
   Hair chromium and manganese were significantly low. Studies show these two minerals to be intimately involved in proper carbohydrate and fat metabolism.

Mr. R.B. is not an unusual or exceptional case of arcus juvenilis associated with biochemical derangements. Over the past three years I have observed dozens of such cases. The common denominator for all of them is impaired lipid metabolism usually associated with abnormal

Concluded P. 34

Reflections on Anti-Reflection Coatings

B.R. Chou*

Abstract

Recently several ophthalmic suppliers have advertised lines of spectacle lenses with anti-reflection coatings. In this paper, the need for anti-reflection coatings and the underlying optical principles are reviewed, and manufacturers' claims are critically examined.

Abrégé

Depuis quelques temps certains laboratoires de produits optiques offrent des lentilles ophtalmiques ayant des couches anti-réflettantes. Ce travail revoie la raison d'être de leur utilisation et les principes d'optique régissant leur performance. Enfin ou scrute d'un oeil critique les réclames fait à leur sujet.

Introduction

Anti-reflection coatings are applied to ophthalmic lenses in order to reduce unwanted reflections from lens surfaces, and to increase the amount of light passing through the lens to the eye. They are usually applied to lenses of high power to improve cosmesis by reducing internal reflections, and to the back surfaces of tinted lenses to eliminate ghost images.

Recently several ophthalmic lens manufacturers have introduced lines of finished lenses which feature anti-reflection coatings. The aggressive approach which has been adopted by some in advertising these lenses to the public makes it necessary for the practitioner to review the rationale for prescribing single or multiple anti-reflection coatings to spectacle lenses.

Why anti-reflection coatings?

Reflections from lens surfaces can be annoying to the spectacle wearer for both cosmetic and visual reasons. Cosmetically, surface reflections are objectionable because of the appearance of power rings, especially in high-minus lenses, as well as the veiling effect of the reflected light which decreases the visibility of the lens wearer's eyes to an observer. (See Figure 1).

Visually, the surface reflections arising from the cornea and the two spectacle lens surfaces can be distracting. (See Figure 1). These ghost images are more significant with high lens powers, steeply curved surfaces, high index of refraction or dark lens tints. The effect of lens parameters on optical properties of ghost images is described in detail by Long[1-4], Jalie[5], and Brooks and Borish[6], among others.

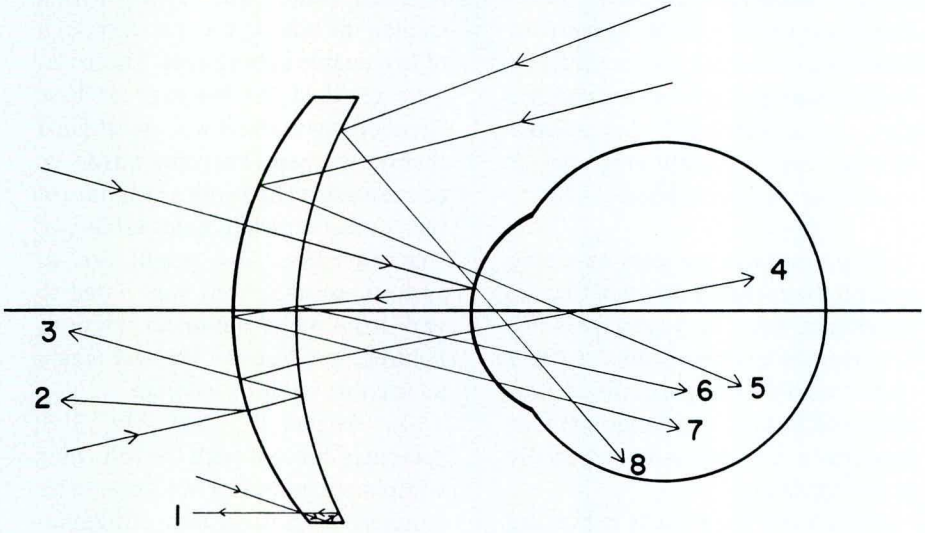

Fig. 1 Surface reflections from the cornea and the two lens surfaces give rise to power rings (1), veiling glare from light sources in front of the lens (2,3), and ghost images (4,5,6,7,8).

How do they work?

Fresnel's equation[5] gives the fraction of light reflected at an interface between two optical media for a beam at normal incidence:

$$\rho = \left(\frac{n_2 - n_1}{n_2 + n_1}\right)^2$$

For a lens in air with a thin film deposited on its surface we can determine the reflection loss at each interface:

$$\rho_1 = \left(\frac{n_1 - 1}{n_1 + 1}\right)^2$$

at the air-film interface, and

$$\rho_2 = \left(\frac{n_2 - n_1}{n_2 + n_1}\right)^2$$

at the film-lens interface where n_1 and n_2 are the indices of refraction of the film and lens materials.

The wave theory of light tells us that to eliminate reflections from the air-film-lens system we must satisfy two conditions.[5] Firstly, the two reflected beams must be 180° out of phase; this can only occur when the optical thickness of the film is ¼ — wavelength, or

$$nt = \lambda/4$$

This is the path condition.

We must also select a film which produces reflected beams of equal amplitude. The amplitude condition

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$\rho_1 = \rho_2$

is satisfied when

$n_1 = \sqrt{n_2}$

Note that we are assuming light of a given wavelength λ at normal incidence. Clearly these conditions are not met when we consider light at oblique incidence with many wavelengths of radiation involved. The best we can achieve then is a minimum intensity of the reflected beam. While the transmittance in visible light of a crown glass lens is approximately 92%, the single thin AR coat increases the overall transmittance to approximately 96%.

The amount of reflected light can, however, be further reduced by using an appropriate selection of dielectric coating materials such as magnesium fluoride (our standard anti-reflection coating) and, say, oxides of titanium and silicon[5]. Vacuum-deposited at high temperature as a series of thin films on a lens surface, these materials can be used to minimize reflections over several wavelengths in a multiple anti-reflection coating (multi-AR). Using between 2 and 9 discrete layers, it is possible to achieve as high as 99.5% transmittance.

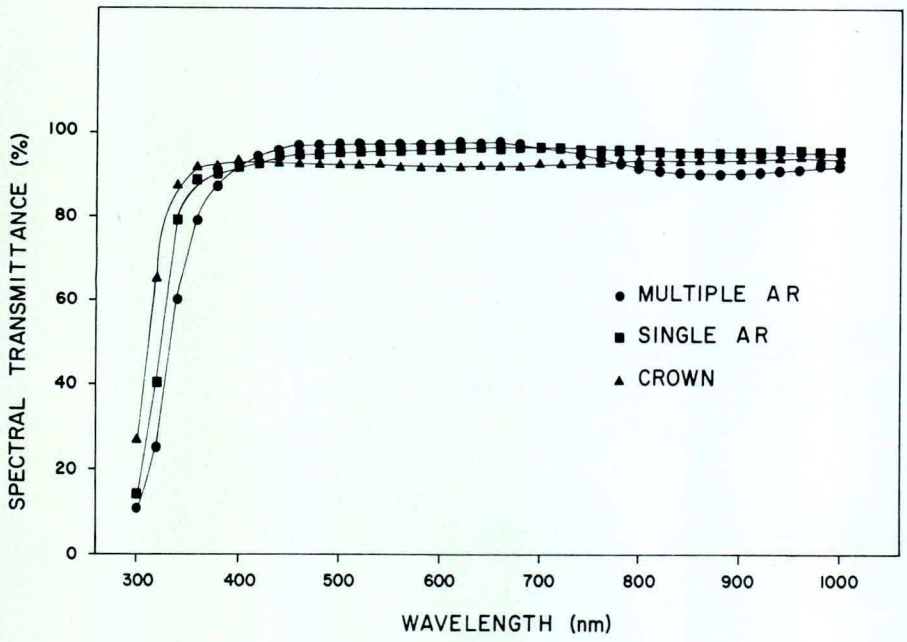

Fig. 2 Typical spectral transmittance curves of plano 2mm-thick ophthalmic crown glass lenses. a. uncoated; b. AR-coated; c. multi-AR coated. Transmittances were measured on a Zeiss DMR-21 dual-beam recording spectrophotometer.

TABLE 1

Anti-reflection Coatings

Supplier	Trade Name	Layers	Colour of Reflections
Essilor	Superdiafal	Multiple	Purple (very dim)
Imperial	Hilite coated Titanium	Single MgF_2	Purple
Vilico Superlite	HMC	Multiple	Green (dim)
Zeiss	ET	Single MgF_2	Gold
Zeiss	Super-ET	Multiple	Gold (dim)

Reproduced below (Fig. 2) is a comparison among uncoated, anti-reflection coated, and multi-AR coated lenses. It is evident that both coated lenses transmit more visible light than the uncoated lens, and the multi-AR coated lens has the highest transmittance across the visible spectrum (400 to 700 nm). Surface reflections, power rings and ghost images would be least conspicuous in the multi-AR coated lens, and worst with the uncoated crown lens.

Available AR-coated lenses

Most, if not all, optical laboratories are set up to supply magnesium fluoride (MgF_2) single-layer anti-reflection coats; larger ones may also do multi-layer AR coats. In the latter case, the number of layers and their composition are determined by the individual laboratory.

The lenses advertised by Essilor (Superdiafal), Imperial Optical (Hi-lite Coated Titanium Lens), Vilico Superlite (Hoya Multi Coat or HMC), and Zeiss (ET or Super-ET) are manufacturers' standard glass lenses with the supplier's specific AR coating supplied on the lens. The information on these coatings is given in Table 1.

Readers should note that both the Zeiss Tital and Imperial Hilite Titanium lenses are made from the Schott titanium high-index glass. An order for Tital-ET or Hilite Coated Titanium is automatically filled with a single-layer MgF_2 AR-coating on both surfaces. The coating is therefore the same as the "Standard" AR coating which can be applied to any glass lens.

Superdiafal, HMC and Super-ET are proprietary multiple-layer coatings which can be distinguished by the colour of the surface reflections. (See Table 1). As advertised, these multi-layered coatings produce very faint residual reflected images.

What do you choose?

On the whole, it would appear that the anti-reflection coatings being advertised in the ophthalmic literature are not substantially different from those which have been supplied by most fabricating laboratories. They do have the advantages, in theory, of better quality control over the coating applied to the finished lenses. However, this is a moot point.

In terms of availability, certain lines of lenses (particularly HMC and Zeiss Filter-ET) are not *stocked* in a full range of spherocylinder power, but all can be ordered on a special order basis. By contrast, the "standard" laboratory treatments can be ordered for any lens.

Concluded P. 34

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Cleans lenses two ways

Combines a surfactant cleansing agent with microscopic polymeric beads that break up and remove tenacious protein deposits.

Simplifies lens cleaning

The only contact lens cleaner required for most patients. In a multi-centre study, 40.5% of patients tested previously used both a surfactant and an enzymatic cleaner. No one needed any additional cleaner during the three-month trial of Polyclens.[1]

Promotes thorough rinsing

Polyclens is milky white and slightly textured. When the patient cannot see or feel any solution on the lens, it's properly rinsed.

Clinical trials showed that patients favoured this unique texture. All agreed that it was the best cleaner that they ever used.[1]

Keeps new lenses like new longer

In two separate three-month clinical evaluations, 95.4% of soft lenses and 89% of hard and gas permeable lenses, which were classified as clean at the beginning of the trial, remained clean following the use of Polyclens, even though no enzymatic cleaner was used.[1,2]

Cleans all types of contact lenses

Clinical trials have proven Polyclens to be an effective cleaner for all types of contact lenses including PMMA, Gas Permeable and soft lenses.

Helps restore worn lenses

Significant improvement was noted even in lenses which had visible deposits when the study began. A decrease in deposits was visually apparent; improved lens comfort and visual acuity were noted by patients.[1]

Increases comfort during wear

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Rona from P. 29

glucose tolerance (but not always). I have yet to see a case of arcus juvenilis where these facts do not hold true. In Mr. R.B.'s case, it is clear that his risk for both coronary artery disease as well as diabetes mellitus is above average. Incidentally, Mr. R.B.'s father has both mild adult - onset diabetes as well as high blood pressure and a pacemaker at the age of 76.

By using arcus juvenilis as an alert for prevention of coronary artery disease as well as diabetes mellitus we may be doing many of our patients a great service. Arcus should alert the practitioner to arrange for appropriate biochemical testing (glucose tolerance test, lipid profile, liver function tests) to rule out the possibility of either existing or impending pathology. Certainly, it is not a sign that should be ignored.

Once the biochemical abnormalities are elucidated by blood, urine and hair mineral analysis, an appropriate diet can be discussed with the patient as well as possible lifestyle modifications.

We encourage other practitioners to at least look into this holistic approach to patient care (eye and otherwise).

We have seen one case where Wilson's disease, hepatolenticular degeneration, presented first as a faint corneal arcus in a teen-aged boy.

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Chou from P. 31

The most important consideration in ordering AR coated lenses should be whether the patient is particularly annoyed by ghost images. A bright ghost image can be made dim enough to be negligible with *any* type of anti-reflection coating, regardless of whether the image is seen in or out of focus. Clearly patient complaints should have priority over fashion considerations.

In summary, there is little difference between the "new" brand-name lines of antireflection coatings and the coatings for any glass which have always been available from optical laboratories. However, the decision to use a "brand-name" or "no-name" anti-reflection coating is a matter of the prescriber's personal preference.

Acknowledgements

I thank Dr. G.Y. Mousa for his constructive comments during preparation of this paper. The contributions of lens samples by Superlite Optical Ltd., Essilor Canada Ltd., and Carl Zeiss Canada Ltd. are gratefully acknowledged.

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GOODWILL - what is it worth in the market?

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Jay Lieberman, DMD†

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Abrégé

Ce travail discute des valeurs immatérielles que les dentistes définissent comme "practice goodwill". Comment établir la valeur marchande de ce "goodwill"? On offre une définition en termes économiques et on présente une formule pouvant servir à estimer et à négocier le prix du "goodwill". On offre des conseils sur la meilleure utilisation de la formule. Enfin on discute de quelques situations pouvant influencer le prix du "goodwill" dans certaines circonstances particulières.

John Barton graduated from dental school, completed a year's general practice residency, and decided to go into private practice in a small town in Wisconsin. The town he chose is 120 miles from his hometown and seems to fit all his needs. However, as he does not know anyone there, he is not sure that patients will want to be treated by "that new young dentist."

So, John Barton has chosen to associate with an established dentist whose name is known and whose practice is successful and growing. He figured that he could earn a percentage of his gross and pay his lab fees. For John Barton, this was a workable arrangement and the economics of the situation seemed fairly straightforward. However, the dentist was more interested in taking John in as a partner and immediately brought up the question of "goodwill in the practice."

Arthur Ross and Don Martin are dentists who have a successful practice as associates. Ross has been in practice for 19 years, and Martin joined him two years ago immediately after dental school.

Both dentists have pretty much established their own patient loads and help each other out with emergencies. The associateship has been lucrative for both men — Martin has moved quickly into a practice that has a well-known reputation for quality dentistry; and Ross is able to enjoy a bit more free time while taking in a percentage of Martin's earnings.

Both have a full partnership in mind for the future. Martin thinks that in his two years in practice, he has been an asset to the office, and word-of-mouth has helped him to bring in some new patients. Ross agrees that his associate is an asset, and, in fact, sees him as a vehicle to make early retirement possible. But, for all his years of building the practice, Ross figures in drawing up a partnership, he is due some "goodwill" compensation.

The "fly in the ointment" in both of these situations is goodwill: a term that can be misunderstood, misused, and at best, confusing.

The market value of tangible assets such as dental equipment or real estate can be readily and accurately estimated based on the cost of replacing these assets in today's market. A catalogue that gives the price of new and used equipment provides the information needed to make an appraisal. With real estate, a public record of recent sales is a reliable basis for appraising the market value of the property.

In contrast, goodwill is an intangible asset; its value is related to the professional reputation of the established dentist. It presents a different problem for appraisers because there is no readily available, reliable information on the cost of replacing this asset. Even if a large sample of the sale prices of dental practices was available, because these prices include the value of tangible assets, they would not provide sufficient information for appraising goodwill.

Perhaps because of these special problems, there are few references in the dental or accounting and management literature on the problem of appraising goodwill. E.H. Weinwurn, a certified public accountant writing in *Management Accounting,*[1] argues that goodwill reflects market recognition of future value but he does not provide a method for estimating the future value of a practice. At the other extreme, J.E. Dunlap, writing in *Dental Economics,*[2] suggests that dentists estimate the value of goodwill by multiplying a 20th of the past year's net incomes by the number of months they agree to stay in the practice. Dunlap warns that this formula provides only a rough estimate. However, the fact that Dunlap emphasizes past performance as a key to estimating the value of goodwill seems to conflict with the approach suggested by Weinwurn. In this paper we provide the rationale behind our own formula for appraising the value of goodwill in a dental practice.

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Buying a reputation

Practitioners are willing to pay for goodwill because a good professional reputation and being known in the community are important factors in determining the financial success of a dentist. Moreover, to some extent these financial rewards can be transferred to another practitioner who joins the practice. Thus, it follows that a practitioner who is starting out or relocating might increase his income by becoming an employee or partner in an already established practice. Because the new practitioner expects to earn more as an associate, he is willing to pay the established dentist for the privilege of associating.

The financial benefits that are transferred to the new associate will probably last no more than four years. As the new associate establishes a professional reputation and becomes known, his income depends more on personal performance and less on the reputation and contacts of the established dentist. Thus, a dentist who purchases goodwill is buying a privilege or property right that has a limited life.

The reason why an intangible asset such as goodwill exists and has an expected life of four years is shown in the Illustration. In this graph, the vertical axis measures income in dollars and the horizontal axis measures time lapse in years. A dentist who has to choose between becoming an associate in an established practice or starting on his own faces two possible streams of net income: as an associate, he expects to capitalize on the reputation of an established dentist and start at an annual rate of return indicated by 0a; as a new practitioner, he expects to start at a lower level of net income depicted by 0b. Until the end of the fourth year, he expects his net income to be higher as an associate than it would be as a new practitioner. However, during the first four years as a new practitioner, his net income is expected to grow more rapidly than his net income as an associate until the end of the fourth year when his net income as a new practitioner or an associate would be equal. The triangular area in the Illustration bounded by bca represents added income the dentist expects to earn as an associate over what he might earn in his own practice. It is a measure of the potential wealth that the established dentist can transfer to a new associate in the first four years of the association.

Why do we believe four years is a more appropriate time than three or five years? First, on the basis of discussions with dentists in the Philadelphia area, reports in journals on dental practice management, and in the literature of dental supply dealers, it was agreed that approximately four years were required to establish a private dental practice in a new location. In addition, data from *The 1977 Survey of Dental Practice* supported the four-year assumption. For dentists who have been out of dental school for one to four years, those in private practice for themselves reported net incomes that were lower than net incomes reported by salaried dentists practicing in a public clinic or with another practitioner. However, for reporting dentists who were out of dental school for more than four years, those in practice for themselves reported roughly the same or higher net incomes than salaried dentists. Because of the small sample of respondents and the fact that years since graduation and years in private practice for any respondent can differ, our interpretation of the data can be questioned. However, in the absence of a larger sample and a better measure of number of years in private practice, we believe the ADA survey of dentists throughout the country supports the four-year assumption.

Goodwill negotiations
Some guidelines:

- **Performance**

  Agree on the associate's future performance.

- **Income**

  Agree on the associate's projected gross income over the first four years.

- **Expenses**

  Determine the associate's impact on the practice operating expenses over the first four years.

- **Terms**

  Examine the associating terms of other practicing dentists in the area.

One further comment is necessary. In areas where market competition is relatively high, establishing a new practice will probably require five years rather than four and, as a result, the limited life of goodwill offered by practitioners in these areas would be five years. However, in locations where competition for patients is relatively low, a new practice would take less than four years to establish and the limited life of goodwill offered by practitioners in the area would be less.

It follows that usually a new dentist associate will either enter a partnership with the established practitioner or leave within four years after joining the practice. If a partnership is formed after four years, there should be no payment for goodwill. After the end of the fourth year, the new dentist is established and gross revenue will no longer depend on the professional reputation of the established dentist.

The established dentist supplies the privilege of association if he expects it will increase his income or the net worth of his practice. By selling or renting access to his professional reputation, the established dentist is capitalizing on an intangible asset that he has produced over time. This is the essence of the intangible asset, goodwill. The difficult questions are "How can the new dentist estimate a fair market price for goodwill?" or from the established practitioner's perspective, "What can he hope to receive for an intangible asset that has taken years of professional service to create?" These are difficult

questions. An exchange of goodwill will require much negotiation between the buyer and seller. It is often difficult to get the kind of data that provide a basis for these negotiations. Obviously an accountant is needed to collect data and advise on the procedure.

But even though there is no simple direct way to measure the price of goodwill in all situations, we believe there are guidelines that can greatly simplify the negotiations and help the two parties agree on the value of goodwill. We suggest that both parties follow the four following guidelines and then use a related formula to determine the price of goodwill.

— Focus on how the new associate is expected to perform in the practice in the future. Becoming an associate is valuable to a new dentist because it can help him increase future income. By adding a new associate, an established dentist can help to increase future income. Past performance and characteristics of the practice can help identify practices that can profitably use a new associate, but these characteristics affect the value of goodwill only insofar as they relate to future performance.

— Agree on what the new associate dentist is expected to gross in the first four years with the practice. Of course, many factors related to patient demand and the efficiency of the new dentist have to be considered before this type of projection can be made. However, agreement on a projection or at least a range of projections is a central factor in determining the value of goodwill.

— Agree on what impact the addition of a new associate will have on the operating expenses of the practice for the next four years. Given the estimate of how much production is expected to increase with a new associate, how much will this increase the operating expenses of the practice?

— Determine under what terms new dentists are associating with established practitioners in the area. What portion of their gross revenue are the new associates paying to the established dentists? Are new associates paying a share of the operating expenses or are all these expenses covered by owners of the practice?

After the potential buyer and seller of goodwill have reached some agreements on the aforementioned issue, the following formula can be used to estimate a market value for the goodwill involved:

Goodwill = GL - g - f (0_s - g) in which: G = expected gross revenue of the new associate to the end of the fourth year; L = the portion of G paid to the dentist/owner; g = the expected increase in operating expense associated with the new dentist to the end of the fourth year; 0_s = expected operating expense to the end of the fourth year without the new associate; and f = the share of operating expense that is paid by any new associate.

The logic behind this formula requires explanation.

The new dentist is encouraged to associate with an established practitioner if he believes it will increase his net income in the first four years over what it might be if he started his own practice. He has a further incentive to become a partner or stockholder in the practice so that he can obtain some proprietary rights to the pool of patients that he develops as an associate.

The formula we recommend assumes that the new dentist has sufficient financial reason for wanting to associate with the practice. The variables in the formula outline the financial options and incentives that are open to the established dentist and owner of the practice.

The additional net income the established dentist expects to receive from the new associate is represented in the formula by GL - g. These figures represent the associate's expected gross revenue multiplied by the portion of gross paid to the established dentist less the increase in operating expense expected from adding a new associate. These figures include the income and expense that accrue to the end of the fourth year after the new dentist becomes an associate. The added net income, GL - g, provides the incentive for the established dentist to add a new associate.

However, in the case in which a new associate becomes a partner or shareholder in a practice before the fourth year of association, the established dentist foregoes the net income, GL - g, which he could expect to receive if the new dentist remained an associate for the full four years. Therefore, it follows that the established dentist would expect the new associate to pay an amount equal to GL - g for the remainder of the four-year period.

However, the loss of expected income the established dentist experiences when he takes in a new partner is not the full story because there are financial advantages to accepting a new partner. The addition of a new partner means that half of the operating expense incurred by the practice will be paid by the new partner and, in most cases, this has a positive effect on the established dentist's owner net income. When a new partner pays half the operating expenses, the established dentist gains as he now pays only half of his operating costs but loses as he has to pay half of the additional operating expenses that result from having a new partner. In the most common cases in which the gains outweigh the losses, the established dentist is willing to pay an associate to become a partner and share the operating expense of the practice during the first four years of the partnership. Specifically the established dentist can pay the associate up to an amount f (0_s - g) to become a partner.

As it turns out, making an associate a new partner has a dual impact on the net income of the established dentist. Although it reduces his net revenue from the practice by GL - g, his expenses are likely to decline by an amount equal to f (0_s - g). Thus, the impact on the established dentist's net income of adding a new partner is equal to GL - g - f (0_s - g) which is the amount he expects the new partner to pay for the goodwill in the practice. In other words, the difference between GL - g and f (0_s -

g) represents the value in the practice attributable to goodwill.

By using the guidelines and the foregoing formula, it is possible for John Barton and his future associate to reach an agreement on a fair market value for goodwill. For example, assume both parties agree that John will gross $300,000 during the next four years; operating expenses (0_s) without John are projected at $150,000; with John as an associate, operating expenses are expected to increase by $100,000 (g) to $250,000 for the four years; finally, new associates in this area of Wisconsin receive 55% of their gross revenue with 45% (L) going to the established dentist. Given these assumptions, the formula discloses that $10,000 is a fair price for the goodwill John Barton purchases in the established practice:

LG - g - ½(0s - g) (.45) ($300,000) - $100,000 - (.5) ($50,000) = $10,000.

Estimating a fair price for the new dentist, Martin, to pay for goodwill in Ross's practice is different because Martin has been an associate in the practice for two years. The two can probably agree fairly easily what Martin will gross during the next two years. Deciding on the portion of Martin's gross revenue that would go to Ross is more difficult because their professional relationship is unique. Assuming the two can agree on an appropriate portion of Martin's gross revenue that will go to Ross, the formula can be used to get an estimate of the value of goodwill. To clarify, let us assume that Martin's gross for the next two years is set at $240,000 (G); if Ross operates the practice alone, operating expenses for the next two years are expected to be $120,000 ($0_s$); and Martin would retain 60% of his gross if he remained an associate for the next two years. Given these assumptions, Martin would pay $6,000 for the goodwill he purchased in Ross's practice:

GL - g - f(0s - g) = goodwill
$240,000 × .4 - $60,000 - .5 ($120,000 - $60,000) = $6,000.

Price of goodwill varies

As indicated by our formula, the price of goodwill changes directly with changes in projected gross revenue of the new practitioner. However, the value of goodwill varies inversely with the level of operating expenses attributable to the new associate and with the fraction of gross revenue that goes to the new associate dentist. What are the market factors that determine increases in the level of operating expenses and the portion of gross revenue going to new dentists? As these are important determinants of the value of goodwill, a discussion of the economic factors reflected in these variables is needed.

The portion of gross revenue that goes to the associate dentist is a key factor in most associate contracts. The owner of the practice is expected to offer a figure that is sufficient to induce a new associate to join the practice. Thus, it follows that in an area or at a particular point in time in which new practitioners have good alternatives to joining an established practice, owners have to offer a higher percent of gross to a prospective associate and the price of goodwill will be less. But, if new practitioners find it difficult to start on their own, established dentists can hire associates by offering a smaller portion of gross revenue, and the value of goodwill in an established practice will be greater. The portion of gross revenue that goes to a new dentist is a key variable that adjusts to clear the market for associate contracts and inversely affects the price of goodwill in a market area.

Similarly, the supply of dental equipment and auxiliary manpower available in a market area can have a direct impact on operating expenses and, in turn, on the general value of goodwill in an area. If new associates or partners can be accommodated with currently hired auxiliaries and equipment, the addition of a new dentist to the practice will have little impact on the level of operating expense incurred in the practice. With a given projection of gross revenue and a portion of gross going to the new associate, the dentist adds more to his net income by hiring an associate and the price of goodwill in the practice is higher. However, when the established dentist has to hire additional auxiliaries or buys new equipment, or both, to accommodate a new associate, the impact on operating expense will be greater, and, with a given projection of gross revenue and portion of gross going to the new associate, the value of goodwill in the practice is less.

Because the value of goodwill depends on the demand for associate contracts and the availability of dental resources, it is possible for the price of goodwill to be negative. Of course, it is unusual to hear of an established dentist paying a new associate to become a partner but this is what happens when an associate buys into practice at a price below the market value for his share of the tangible assets. For example, take the case in which the value of inventory and equipment is appraised at $50,000 and a new partner buys an equal share in the practice for $20,000. The new partner is in effect paying $5,000 to become a partner. The established dentist gives up equity valued at $5,000. In return, he gains a partner who shares the operating expenses of the practice. Thus, in dental markets in which the expected gross revenues for new associates are low or the added operating expenses of having a new associate are high, or both, the established dentist can expect to sell goodwill at a negative price.

John Barton's situation can be used to illustrate the possibility of a negative price for goodwill. For example, if associates in this area of Wisconsin are getting contracts for 60% of their gross revenue rather than 55% as previously assumed, a fair market for the goodwill John Barton purchases would be a negative $5,000. This figure is calculated assuming that John Barton's gross of the next four years is expected to be $300,000; that the expense of the practice without John Barton for the next four years will be $150,000; and that John Barton's presence will add $100,000 in operating expense during this period:

GL - g - f(0s - g) = goodwill
($300,000 × .4) - $100,000 - ½($150,000 - $100,000) = - $5,000.

The established dentist pays John Barton $5,000 and foregoes the $20,000 in expected income that would come with Barton as an associate. In return John Barton agrees to pay half the operating or $125,000 during the next four years, which saves the established dentist $25,000 in projected expenses for that period. If Barton takes anything less than $5,000 to become a partner, his net income would be less than what he could earn as an associate in the practice.

Goodwill in perspective

The decision of whether to join a partnership is complex and rarely hinges on purely economic considerations. It is unwise to negotiate the price of goodwill until you have addressed the more basic questions, such as: do you like your potential partner or partners?; is your philosophy of dental care consistent with theirs?; and does the partnership improve your opportunities for professional growth? Answers to these questions are most important and only indirectly related to economic outcomes.

After you decide to become a partner, you have to agree on a fair price for buying into the established practice. Remember, a fair market value for a practice depends on the value of its tangible and intangible assets. It is relatively easy to appraise the value of the tangible assets. Determining a fair market price for the intangible assets, goodwill, is the real problem.

To be fair to yourself, you need to spend a good deal of time gathering information, analyzing data, considering what the future holds, and projecting what your gross revenue will be as a partner in the practice. Basically, you are developing a scenario of what is most likely to occur during your first four years with the practice. A management consultant or accountant can point you in the right direction and do some of the analysis but you need to understand and control this process. By focusing on relevant topics and making these topics the center of negotiating, you can agree on a price of goodwill that is fair to both parties and will start your new partnership on the right foot.

Summary

This paper discusses the intangible asset that dentists refer to as practice goodwill. How is the market value of practice goodwill estimated? After defining goodwill in economic terms, a formula is given that dentists can use to estimate and negotiate the price of goodwill. Guidelines are suggested that indicate how the formula can best be used. Some general market conditions that can affect the price of goodwill in a particular area are discussed.

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Profiles in History: W.M. (Bill) Lyle

CJO

At what age did you enter Optometry and what prompted the decision?

BL

Well, what happened was that some friends of ours knew Ed Bind. Ed was the first Director of the School, before Dean Thompson — actually, he hired Thompson. Anyway, these friends said to him, "We know a young fellow out in the country who we think should be in the program." And when they called me, I said, "What's optometry?" I'd never heard of it. So they said, "Well, it's almost a profession." To me that sounded pretty good, although I'd actually come to Toronto to register in Engineering — a family friend was going to help me pay my way through Engineering School. But when these closer friends told me about optometry, I agreed to take a look at it.

CJO

Were you in Winnipeg at that time?

BL

No, I was living in the little village of Prince Albert, about fifty miles east of Toronto.

CJO

So your concept of optometry at the time was . . .

BL

Nil.

CJO

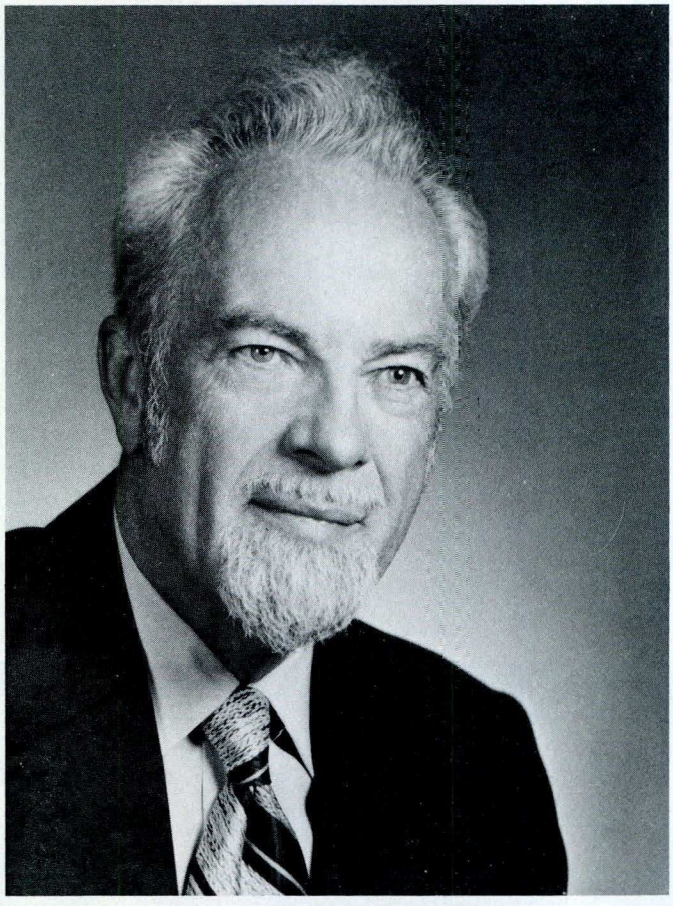
Other than the recommendations of your friends, did you make any attempt to find out anything about optometry?

BL

None of all.

CJO

You took it entirely on faith?



BL

Blindly, yes. There is one other thing. My mother was a public health nurse, and I was brought up in an environment which constantly revolved around health. She ran a sanitarium — she was the first superintendent (as they were called in those days) of nurses in the Royal Victoria Hospital in Montreal, when it opened. The city later gave her a diamond ring and an engraved scroll in appreciation of her years at Vic. So the health field was not a strange one to me. Hypodermic needles, morphine, care of mentally disturbed people — that was regular conversation to me.

CJO

But you had no concept of what you were actually getting into as a student?

BL

None at all. My high school principal in Port Perry had said, "Why don't you go to university?" But I couldn't possibly afford to do so. Don't forget we were in the very depths of the Depression — this was 1933. So these friends in Toronto, who had considered my potential and recommended me to Ed Bind, actually brought the two of us together.

CJO

Did your initial impression of the School and its facilities re-inforce the perception of Optometry as "almost a profession"?

BL

Yes, it did. We were taking biology

with the dental students, physiology and psychology with another group of students, and so on. We took our courses on the University of Toronto campus, and it seemed as if the dentists and optometrists were equal — we had the same biology instructor, and wrote the same exam. So I began to feel that optometry was actually a health-related science.

CJO

Did the fact that the School was so small (it was still at 138 St. George St.) have any effect?

BL

Yes, that was depressing. Mind you, I was a very unsophisticated farm boy, and I really had no knowledge of Toronto. But I did think it was a tired-looking facility, not at all impressive. That old red brick building was not my idea of a very substantial, or even modern, institution.

CJO

What were your first impressions of Dean Thompson and what influences did he have on you?

BL

He was a man with a sense of humour, clearly a man who was humane, in that he recognized the struggles students were going through, and the many problems they faced. And he encouraged me.

I also remember one night I went to play bridge at his house. I had never played bridge before in my life, so Mrs. Thompson suggested which cards to play, and helped me all through the game. Well, I had extraordinary cards that night at Thompson's house, and actually won the prize, something that hasn't happened since.

He was not a man who was domineering. He never seemed to be unfair or unjust.

At that time, Ed Bind was still there, teaching pathology. (Dean Thompson taught physiological optics and Colonel Cooper was an administrator.) In the second year of this (then) two-year program, Ted Fisher, Fred Attridge, Art Stemp and Clark Patterson were clinicians. Don Graham was a student in the year ahead of me, and I believe he became a clinician, as well.

CJO

What about other members of the faculty?

BL

Well Fred Conboy, the Mayor of Toronto, was very impressive. He'd come in with a flower in his buttonhole, and a sharply-pressed suit, and give his lecture, from the same notes that he had been using for dentistry for twenty years, with no change. But he was somewhat inspiring nevertheless. He said the right things, even though they were hackneyed and rather trite. After all, he was the Mayor of Toronto, with all the front and nerve that such a role requires. It's like being an army officer; you've got to look the part, or you are apt to be unsuccessful.

CJO

He was a dental surgeon.

BL

Yes, and he taught us what he called "praxis" — practice management. He taught for years; he taught me and he also taught the veterans. Actually, I suspect there was no transmission from his brain to our brains. There was, rather, a bit of transmission from his notes to our notes. Nevertheless, his model was effective. He taught us what a professional person's demeanour should be.

CJO

Now, of the various subjects you took, which do you feel were the most important to the profession, and are they different from the ones you think are most important today?

BL

It probably sounds very old-fashioned today, and it may actually be surprising, coming from me, but I still think optics is the key subject. I'm rather unhappy about the temptation today to overemphasize pathology, even though I have spent my life teaching pathology. I enjoy it; I'm knowledgeable; I'm specially trained in it, but today I remind the students that the purpose of acquiring an understanding in pathology is to protect the patient and, secondarily, to protect the practitioner. Studying pathology is necessary, important and interesting, I remind the students. But I tell them, "You must *not* assume that pathology is optometry." Optometry is *not* pathology. Optometry is based upon binocular vision, refraction, optics and related physiological functions. Optics becomes downgraded by some people, because they think it's been studied to death, for over a hundred years. But our essential distinction from ophthalmology is our broad-based knowledge of the physiology of vision.

CJO

You were a practitioner before you became an academic. Do you think that today's academics in optometry should have some more basic training in clinical work?

BL

Somebody has said, "You can't stop a good student, and you can't do much to help a bad one." I feel the same way about the people who take on the faculty role. If they have what it takes, they're going to do a good job, and one should not attempt to direct them too much. You can write a course description; you can apply pressure; but professors are going to teach what they believe should be taught and they are going to emphasize what they want to emphasize, to a great extent. So the critical decision really occurs when you hire that person. At the same time, I believe that a teacher who is hired because he has done interesting research relevant to optometry, is better able to teach, regardless of whether he has much clinical experience. But I also believe that clinical experience adds another, positive dimension to a teacher. The students who graduate now have a great deal of background knowledge, and they're going to adopt their own clinical procedures anyway. What

they need is to be able to think about what they're doing, and to understand it. Why they're performing a test, and what is occurring, are more important than any technique that one can teach.

CJO

We weren't speaking necessarily of teaching techniques, but rather the overall concept of the practice of the profession. Do you feel that it is enhanced by a person's having had experience as a practitioner?

BL

Well, there are certain benefits in clinical experience. It's possible, as you know, to put two new graduates into associate practices, and one would benefit, and one would not, because not *all* practice experience is good. Practitioners generally feel that they could come to the school and give the students a useful series of lectures. Some may feel that they could give better lectures and better instruction than the present people do, but most practitioners who do enter the teaching program have said that they actually found themselves with much to learn or re-learn. I don't think you can equate hours or years in practice with research and teaching. I realize that it has been said many times there is some danger that the School will be filled with Ph.D psychologists who have only a remote concept of what actually happens in an optometric office; what kind of problems are presented by patients; what kind of solutions have to be arrived at by the optometrist; who pays the rent and the secretary, who pays for the stationery, who arranges for the parking and so on. How much time and effort we should be applying to courses related to practice management is an important question. But you can't teach practice management thoroughly and at the same time cover the program that the students have to learn anyway. Some seem to learn how to manage their finances early and others don't begin to learn until they have an overdraft at the bank.

CJO

Is the clinical environment here adequate preparation?

BL

It's far from ideal, but it offers many advantages. More time can be allocated to an individual problem. There are back-up people whom you don't have in practice. There is a different attitude, more equipment and facilities here than there can be in any one practice; and there's a sense that, "If the problem is too difficult, I can call on others for help."

One disadvantage of this clinical environment is that the patient population contains an excess of university students. A graduate is apt to leave here thinking that the average patient is a 20-year old myope, whereas the average patient, I keep telling them, is a 55-year old woman. That's the person you must appeal to; that's the person you've got to think about and learn to communicate with.

On the other hand, an educational institution offers great opportunities. Only this way can we gain entry into the mental hospitals, old folks' homes and the Caribbean area, for example. These situations provide superior learning opportunities, and these experiences are unforgettable. You see more pathology there, and you have the opportunity to provide more care for the whole patient. patient.

CJO

What's happened to eliminate those programs?

BL

Money. The Federal government's restraint program. We were serving the Caribbean people, and training students, — effectively, and not very expensively.

CJO

When *you* graduated, did you feel you had adequate clinical experience?

BL

No, I think I saw a dozen patients all told; and some of these, I brought in myself. I went into practice in Kirkland Lake for a few months, and then I went to Winnipeg. I completed two years in an internship, where I saw 20 patients a day. Now, mind you, it's not as bad as it sounds, because we worked until 6 p.m. in those days. We had complete lab facilities and complete, modern visual training equipment. We didn't have to do any dispensing; other staff did that. So we examined one patient right after the other. We did the examination carefully and completely in half an hour and we saw a broad spectrum of pathology problems. It was great training for me. There were five optometrists; James Shaen was the optometrist who owned the practice. He had taken his optometry courses in Chicago and opened up in Winnipeg.

CJO

Is the office still in existence?

BL

Very much so. It is run by James Shaen's nephew, Manuel Lecker and his son, Robert.

CJO

How long were you there?

BL

I was there for three years or so. It must have been about 1939 - 41, I guess.

CJO

Is it about this time that you enlisted?

BL

Well, that's another long story. I could see the war was coming, so I went to the University of Manitoba and took the Officer Training Course. After that, I entered the reserve army. That is, The Winnipeg Rifles, Third Battalion. Then in 1942, when they went active, I went active.

CJO

And you were discharged when?

BL

In 1946, at the Exhibition Grounds in Toronto. I was actually given my discharge examination by a class-

mate of mine (Lew Collins). Then I came back to the School and took a three months' (I think it was) refresher course, because I'd been out of optometry for the four years I'd been in the army. I returned to Winnipeg and bought the practice of Dave McGuire, who had been the President of C.A.O. and had died a month before I got there. Next year, the H.A. Nott practice became available, and I bought that, on a loan from the Imperial Optical Company, which was very happily arranged on the strength of a handshake only.

CJO

In 1950, the U. of T. informed us that it would cease providing optometry students with instruction in basic science subjects. What is your impression of the effect that this has had on the optometry curriculum and on the profession as a whole?

BL

I don't think it had a very great adverse effect because, shortly after that, optometry got hold of itself to the extent of saying, "Our course merits it, so it is time to start granting the O.D. degree." I think that was a very significant and progressive move, giving that O.D. to the graduates of the school in Toronto. (They did that in 1956, I think.) And the school accomplished this without the blessing or the help of the U. of T.

CJO

Around the same time, the Board of Directors was helping students who showed potential or interest in advanced degrees, by providing some funding. Can you elaborate on the benefits you received under this program?

BL

Well I received, I think, two cheques from the Maybee Fund, and I confess that I can't remember the exact amount. But these two cheques were most helpful to me while I was attending Indiana University. In order to go to Indiana (I had a wife and three small kids), I sold my practice and I sold my house, and I was there for five academic years. I received no government support, so you can appreciate just how much the Maybee Fund helped me. (I also received some financial help from Indiana University, and from the United States government research grants.) However, the time at Indiana consumed the money I had received for my house and for my practice.

CJO

Was it your intention to head into education once you left private practice?

BL

Yes. I had been involved in C.A.O., and was meeting various political people on behalf of the Association; I went to the legislature in Manitoba, for example, and met the Minister of Health, who actually said to me, "You optometrists are nothing. You have an old house down there in Toronto, and you give yourselves some kind of a little 'degree' and it doesn't mean anything." And I thought, "I'm not going to take that from you. The next time I sit across from you, I'm going to have a Master's degree." I agree that this is probably poor motivation — I was reacting instead of leading — but nevertheless, that's what I did. So then I took the O.D. program in Toronto and, while there I talked to Dean Fisher about getting into university. Ted said he would introduce me to Henry Hofstetter, the Dean at Indiana University. So, in Chicago, in the Drake Hotel, Ted introduced me to Henry Hofstetter who advised me to finish the O.D. program, and take additional courses at the University of Manitoba. So I took two years there, and entered the graduate program at Indiana University.

CJO

What subjects did you take?

BL

I can only give you an approximate idea. At Manitoba, I took genetics, two chemistries, — organic and bio, two courses in bacteriology, a course in economics and a course in statistics. Actually, I suspect that Dr. Hofstetter thought that these courses would satisfy me and dampen any urge to undertake more study. However, I went to Indiana and completed both the Master's and the Ph.D. programs there. I was an A student, and, in fact, took courses every summer as well as throughout the academic year. I actually completed a major and three minors. While I was there, it was clear to me that pathology instruction was a problem. (I had taken pathology from Dr. Bal Sparks, the first year that he taught. I registered in general pathology in the Medical School and took the course. Emerson Woodruff was also there. He took the anatomy, I took the pathology and we were the only two that did that. And we were both successful.) I also took another few courses in bacteriology, including pathogenic bacteriology. I took minors in anthropology and psychology. Naturally, all the basic courses dealt with physiological optics.

CJO

You mentioned briefly your involvement in political optometry, — through C.A.O. What led you into that area?

BL

Well, the same inferiority complex. I got involved in C.A.O. not so much from the point of view that it was a challenge. I would interpret it now as simply being that optometrists in Manitoba had elected me to be President of their group, and the next step up was to be appointed as a C.A.O. delegate. About that time, one begins to see the profession in a little broader light and one sees the need to identify optometry, not just to your patients, but to every level of government as well.

CJO

What brought you specifically into the pharmacology area?

BL

Clair Bobier was teaching an introductory course in pharmacology here and he said that he felt he didn't know enough about it, but that it should very definitely be taught.

Since I'd had some recent courses in organic and biochemistry and related topics, I thought it might be possible for me to help in this area. What we did was to go to the Faculty of Pharmacy at the University of Toronto where, fortunately, we found a very congenial group. Ted had some connections and he talked to the Dean. We contacted three professors, Patterson, Kennedy and Marshman, who teamed up and said, "Let's really provide a worthwhile course for optometry." They provided, in fact, our first pharmacology program. I took that course, and was involved in it, both as a student and an organizer.

CJO

It's been fortunate . . . you in pharmacology and pathology, Clair in binocular vision and orthoptics, Ted in optics and contact lenses, — the whole core of our curriculum . . .

BL

I think it's important to understand that Ted Fisher is really an unrecognized genius. Few people give him the credit he deserves. He not only gathered us together and kept us together, he inspired us and made it possible for us to work together. What Ted managed to do by the strength of his own personality, while he ran the School, was to accomplish several important things. He ran the School in very bad times, when there were six students, no money and everybody was saying, "Optometry is dead." But he also ran the School in very good times. I look at my own graduating class and I see that among those whose personal lives seemed the most disastrous, are the ones who made the most money. In other words, it's just as hard to run affairs in good times as it is in bad times. Usually, it takes two different kinds of people; but Ted did it in both, — successfully. He managed the School through all the changes of moving to the University of Waterloo. To maintain cooperation amongst a whole group of individualistic professors is no small achievement.

In addition, I am convinced that Clair, by his dogged personality and his insistence on physiological optics, played a major role in the School's success. He managed to keep the school on an even keel in spite of the emotional involvement many of us felt. He was the stabilizing influence, over the whole period of time. No matter how angry we were, or how discouraged we were, we'd always go back to Clair, and after a few hours of talking to him, he would come up with a rational and reasonable solution to most of these problems.

At the same time, there are two other people who played key roles and were recognized for their leadership by being appointed Directors of the School, Emerson Woodruff and Wally Long. I won't go into the background details of their contributions now, because neither of them are retiring so it's a story still to be completed.

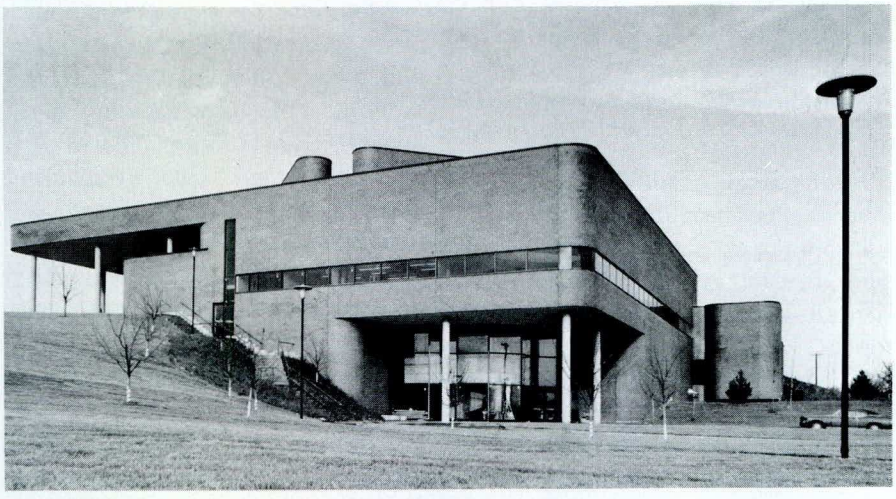
We also have to remember that Irving Baker has made a big contribution. Irving has faced some opposition over the years, but ever since he started seeking cooperation with the Workmen's Compensation Board, he has been a key man all across Canada. His contribution tends not to be recognized by recent graduates and the younger group who are apt to think he's just insisting on rules. But he has done a tremendous job to advance the cause of optometry. He is a thoroughly competent teacher, too, and, like Clair, he doesn't panic but always works for the rational coming-together of ideas to produce the correct solution. No one person has all the answers, but if you can get a team to work together for a common cause, you will have a better answer than any one individual could ever come up with.

CJO

Do you think there will come a time when the teacher of clinical skills has the same rank and prestige as the academic in the basic sciences?

BL

Very hard question, because the answer doesn't depend on optometry. It depends on science; it depends on the university; it depends on outside people; and it depends on personality. You could put some optometrists in the clinic, and if they have enough initiative and enough good ideas, and work hard, they can achieve most of their goals. If status and rank are what you are concerned about, then it is almost impossible to win until optometry becomes a separate faculty. When that happens, it can be determined what the ranks and titles of the various people should be. What they do in medicine is appoint many practitioners as assistant professors. I wouldn't be against that for optometry. There is, however, almost no way such teachers can gain a promotion to become associate professor, in any university, unless one follows the university pathway, which is to perform research and publish the results. Not



"Optometrists from coast to coast all became six inches taller when that happened."

everybody can do it. Especially since a clinician's time is heavily taken up with his or her duties. Some are not interested in research techniques. Personally, I am in favour of a professor title for clinicians and don't feel any jealousy about it. As long as the clinician is aware that any further promotion is possible only if research is done, in other words, following the standard pattern for any professor. Do research; get a grant; produce papers; that's how you get promoted. You could be the best teacher, possibly the best clinician for thirty years and everybody will say, "Great!", but you will not be promoted.

CJO

The Australian schools are now giving Masters of Science in strictly optometric sciences. What is your feeling about this?

BL

I don't disagree with it. There are optometrists here, also, earning Master's degrees in specific optometric fields, like binocular vision and that sort of sub-specialty. These optometrists, at the same time, become better clinicians. There are about six practising in the country now who have Master's degrees in a relatively narrow, but *specific* optometric area.

CJO

How do you see the effect of external pressure on moulding the profession, i.e. its curriculum, its policy and attitudes?

BL

Very greatly, although I'm afraid that too often we are reactors instead of innovators. I think we owe a big debt to ophthalmology. If it hadn't been for an aggressive attitude on their part, optometry would not have achieved the progress it has. One of the reasons for the great improvement in the quality of the program is because, as a defensive measure in response to their political stance, we *had* to teach better. We've had to teach more pharmacology and to learn to understand electrodiagnosis; these are two areas in which the opposition has forced us to advance.

Another pressure that exists is financial pressure. Canada so often follows the United States, where there are now big cosmetic companies and similar conglomerates buying up and franchising optometric practices all across the country. Such organizations argue that they protect the beginning practitioner and guide him in the early stages but they, of course, extract a sizeable portion of his income. The fact that they do some advertising for optometry or for the practitioner is really secondary because the benefit goes to the corporation and not to the practitioner.

I think we still face a threat from ophthalmology because they are moving into dispensing. In the U.S., between 37% and 40% of all ophthalmologists dispense glasses and contact lenses in their own offices. And quite a number of the rest have somebody downstairs or around the corner with whom they have a tie-in. Right now ophthalmology is in transition, and 70% of their work is in refraction. They have never admitted it before, but they're now admitting that most of their work is in refraction. I talked to the Chairman of the Department of Ophthalmology at a Canadian university who says to his students, "You are going to make your living out of refraction. You'd better learn how to do it." It's not as exciting as surgery, not as glamourous, but they are learning, and it's not impossible to learn how to do an average refraction. So far, most of them aren't interested in the problems of binocular vision, or in aniseikonia. One of the weaknesses of optometry is that a second-rate refraction will actually satisfy 85% of the patients. Another 12% require the skills of a real expert, and the last 3%, nobody could satisfy.

CJO

Hopefully, that doesn't mean you spend 85% of your time doing a second-rate job.

BL

No, I never went at it that way. I always did the opposite and actually may have been too involved in precision. I was a practitioner who specified lenses right down to 0.12 diopters when it seemed best for the patient, and I prescribed more vertical prisms than most (one of every 16 patients).

CJO

You said you felt the greatest thing that ever happened to optometry was when we gave the O.D. degree. Would you say that was more significant than the move to Waterloo?

BL

No, but it was a necessary preliminary. It seems now not to have been the greatest thing, but it was an essential turning point. It was probably more important to get into the university system, but one may not have happened without the other. I was in Indiana at the time it was done, and I commend the courage and forethought of the people who were involved. Optometrists from coast to coast all became six inches taller when that happened.

CJO

Do you feel that the people coming into optometry today are as dedicated to "optometry defence", i.e. would they be prepared to go through the same combat that you were obliged to go through? Or do you think that, perhaps, they have been spoiled by what you and your peers achieved?

BL

That's another difficult question, but I'll tell you my views. You can't really tell about people until they are in deep trouble. It's true that the students who enter today have never faced the hard times, the depression, the wars and all the things that our generation went through. But at the same time, they're quality people; and if you take quality people and present them with a challenge, enough of them are going to have the guts and brains and stamina to make their presence felt. I know they would fight for optometry. It would be a shock to them, because they're used

to the easy way, — lots of money; and a few believe that the world owes them a living: "I'm a big Doctor, and I'm a university graduate." But I know that they're quality people, and that if it came to a fight, they would fight very well. They would be fighting on a more sophisticated level than we were able to do, because they are better educated. We all seem to forget, even though it may seem a nasty kind of sociological thing to say, current graduates have brothers who are lawyers, aunts who are physicians, uncles who are judges and, on the average, they come from a higher social stratum. Those connections are valuable and give current graduates a better chance to deal with opposition. I'm not at all pessimistic on that score.

The other thing I would like to mention along the same line relates to inspiration and dedication. I think it was Hitler who said that if you had a hundred people who were absolutely committed to a cause, you could do anything. What happened at the School was that, for 15 years or so, we had five or six people, who worked like beavers to make this place go. We met almost every day, and almost every night, and we worked weekends. There was nothing that anybody wouldn't do for the good of the school, in spite of personal problems, age, needs or wants. That dedication is bound to taper off in time, and it was successful because this small group of single-minded people agreed on the goal. They brought different kinds of skills, but a common aim: the enhancement of optometry. A small group of people like that, with the determination and the commitment and the will to hang together for a cause, constitutes a very powerful force.

Pace from P. 28

Management

The diagnosis of ocular myasthenia gravis was confirmed by the neurologist. Treatment was undertaken using Mestinon. After two months of treatment the diplopia cleared completely. Medication was discontinued and there was no recurrence of symptoms.

The final diagnosis was given as ocular myasthenia gravis currently in remission.

Followup

E.S. remained free of symptoms for one year. Treatment with Mestinon was resumed when occasionally diplopia reappeared, however it was not as severe as during the initial occurrence. He is currently controlled with medication.

Discussion

Myasthenia gravis is a condition which often presents initially with ocular signs. Ptosis, diplopia and lid twitches are among the classical early signs of the disease. There is no affect on pupillary reflexes, visual fields or visual acuities. The patient described above is unusual in that his condition has remained purely ocular; more often there are varying degrees of systemic involvement. Periods of remission are common as was the case with E.S.

The patient presented with recent onset diplopia resulting from a noncomitant deviation. This is always a serious symptom as it may be caused by intracranial pathology or neurological disease. Prompt medical referral is always indicated in such cases.

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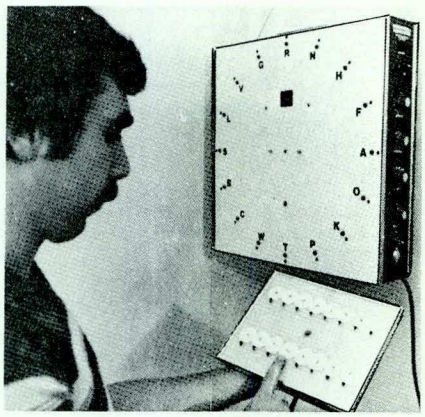

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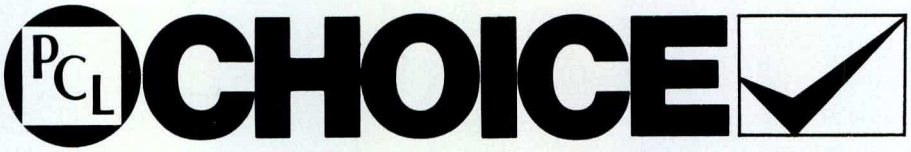

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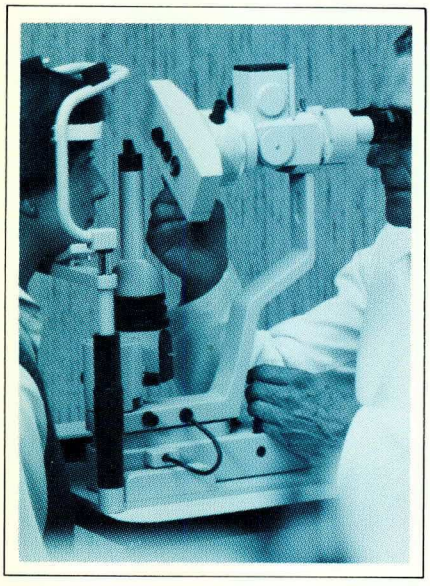

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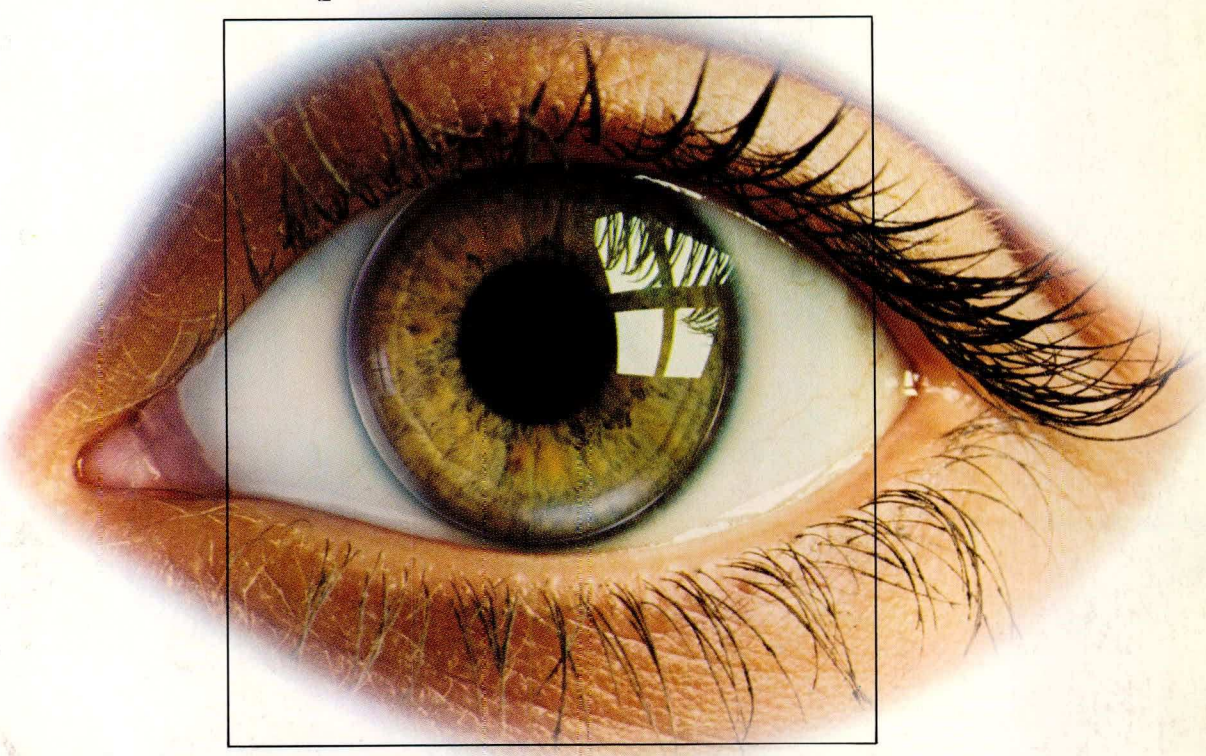

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