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President's Podium • Mot du président

Guest Article • Article Invité

Practice Management • Pratique et gestion

Articles • Articles

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Cover: Spring ushers in a vibrant season of renewal and expectation. CAO President Dr Len Koltun reflects on '*Turning the Page*' in this issue of the CJO (see the President's Podium on page 43).

Couverture: Le Printemps apporte une saison vibrante de renouvellement et d'espérance. Le Président de L'ACO, Dr Len Koltun, réfléchit sur ce que veut dire « Tourner la page » dans ce numéro de la RCO (voyez le Mot du Président à la page 44).

Turning the Page

Tourner la page

Len Koltun, OD
President CAO /
président de l'ACO

" Communication is the Key.
La communication est la clé! "

As we close the book on 2007 I believe we are poised to 'make 2008 great!' I am pleased to report that by virtually any measure, financially, operationally or strategically that CAO had a successful 2007 and that we have already begun building on that momentum in 2008. Before turning the page let's review some 2007 highlights:

- Realizing the most financially successful Biennial Congress in CAO's history. Thank you Saskatoon and all attendees!
- Celebrating the 40th Anniversary of the School of Optometry's move to Waterloo.
- Another successful Eye Health Month. National cohesiveness on this project is absolutely amazing and the envy of many other professional organizations.
- Implementing and monitoring the CAO strategic plan for improved government relations, elevating optometry's standard of care, improving internal and external communications and updating CAO office infrastructure. This master plan also includes incorporating the OLF recommendations for improved communications, education and collaboration to create increased recognition for optometry.
- Preliminary planning for a major study to determine a recommended frequency of eye examinations for the Canadian public.
- Renovations to the CAO office are now complete, and within budget.
- Hiring a new employee, primarily responsible for monitoring our website - our future media for information, education and communications.
- Providing funding for a U of W School of Optometry Forum discussing projections for the future of optometric education.
- Initiating a program of free CAO membership (via application) for optometric students enrolled in all years in all North American Schools.
- Responding to the Competition Bureau report.
- Corresponding to provincial Health Ministers in BC, MB and PEI concerning the compelling need to implement TPA legislation.
- Adopting the theme of '*Communication is the Key*' – a recognition that continued public and intra professional education and promotion of optometric services will open many doors for our future success.

2007 was a good year, and we're on a roll.

Fast-forward to Jan 2008 and a record attendance at our 8th annual Optometric Leader's Forum (OLF). This is our early New Year's national meeting opportunity

PRESIDENT'S PODIUM
MOT DU PRÉSIDENT

to revise, rededicate and kick-start commitments to our goals for 2008.

The 2008 OLF experience was an excellent open and free exchange of ideas providing a spiritual rejuvenation, which really must be experienced to be appreciated. We are now better able to see the forest and the trees and I believe we will continue to be successful by creating and capturing new opportunities then capitalizing on them.

We appreciate everyone's support and confidence in our priority directions. It's important that you know CAO will continue to work hard to provide great value in the year ahead by delivering on these commitments through sustainable operations.

Alors que nous fermerons les livres pour 2007, je crois que 2008 sera une « grande année! » Je suis heureux d'annoncer que l'ACO a connu une excellente année 2007 dans presque tous les domaines, que ce soit financier, opérationnel ou stratégique, et que nous avons déjà commencé à profiter de cet élan en 2008. Avant de tourner la page, voyons ensemble quelques points saillants de 2007 :

- Organiser le Congrès biennal le plus rentable financièrement de l'histoire de l'ACO. Merci à Saskatoon et les participants!
- Célébrer le 40e anniversaire de l'arrivée de l'École d'optométrie à Waterloo.
- Un autre Mois de la santé de l'œil réussi. La cohésion nationale pour ce projet est absolument fantastique et fait l'envie de

LETTER TO THE EDITOR

A "FUNDS-FOR-CHARITY" APPEAL

The charitable trust, Eye Care India, besides being engaged in correcting errors of refraction by way of spectacles, and cataract blindness by way of IOL implantation, among poor patients, organises
(i) 3-day Contact Lens Education Program (CLEP) for diploma-optometrists, and
(ii) enlists optometrists in ECI's Optometric Register.

And this is an appeal for your philanthropic readers to donate the sum of US $ 200 each to support ECI's charity work.

To compensate for their contributions in full, one year air-mail complimentary subscription to Optometry Today (India) quarterly journal will be entered in their names ...and the names will be published as donors in the news section of June 2008 issue of OT.

Contributions, in the name of "Optometry Today" (official organ of Eye Care India) may be sent at C4F/216 Janakpuri, New Delhi 110058, India, Phone +91-11-25599839... and must include donor's complete postal address.

This fundraising campaign will be in operation up to 31st May 2008.

Sincerely,
Dr. Naredra Kumar
Trustee, Eye Care India
Editor, Optometry Today
OptometryToday@gmail.com

beaucoup d'autres organismes professionnels.

- Mettre en œuvre et surveiller le plan stratégique de l'ACO pour de meilleures relations avec les gouvernements, perfectionner les normes de soins optométriques, améliorer les communications internes et externes et mettre à jour l'infrastructure du bureau de l'ACO. Ce plan directeur comprend également les recommandations du FDO pour améliorer les communications, la formation et la collaboration afin de hausser le profil de l'optométrie.
- Planification provisoire d'une étude d'envergure afin de déterminer la fréquence recommandée des examens de l'œil pour les Canadiens.
- Les rénovations du bureau de l'ACO sont maintenant terminées et ont respecté le budget.
- Embauche d'un nouvel employé qui devient responsable de la surveillance de notre site Web – notre futur média d'information, de formation et de communications.
- Contribution financière au forum de l'École d'optométrie de l'Université de Waterloo pour discuter la formation optométrique future.
- Mise sur pied d'un programme d'adhésion gratuite à l'ACO (sur demande) pour tous les étudiants en optométrie inscrits dans l'une ou l'autre des écoles nord-américaines.
- Réponse au rapport du Bureau de la concurrence.
- Correspondance avec les ministres de la santé provinciaux de la C.-B., du MB et de l'I.-P.-E. sur la nécessité de mettre en œuvre une législation sur les APT.
- Adoption du thème « La communication est la clé »… c'est reconnaître que l'éducation continue et la promotion des services optométriques tant pour le public que pour la profession ouvriront de nombreuses portes qui contribueront à nos succès à venir.

2007 a été une bonne année et nous sommes sur une bonne lancée.

Allons maintenant à notre 8e Forum annuel des leaders optométriques (FDO) de janvier 2008 qui a connu une participation record. C'était notre première réunion nationale de la nouvelle année, qui avait pour but d'examiner, de renouveler et de relancer nos engagements face à nos objectifs pour 2008.

Le FDO 2008 a été une excellente expérience d'échanges ouverts et libres d'idées qui ont donné lieu à un rajeunissement spirituel, qui doit être vécu pour être apprécié. Nous pouvons mieux voir maintenant la forêt et les arbres et je crois que nous continuerons à être gagnants en créant et saisissant les nouvelles possibilités et en capitalisant sur celles-ci.

Nous vous remercions de l'appui et de la confiance que chacun de vous témoigne dans nos orientations prioritaires. Il est important que vous sachiez que l'ACO continuera à travailler d'arrache-pied pour faire de la prochaine année une réussite grâce à des activités durables qu'elle mettra en œuvre pour honorer ses engagements.

WANTED: ARTICLES

The editors of CJO*RCO encourage submissions of clinical articles, including original research and case studies. Contact info@opto.ca for more information.

RECHERCHÉS: ARTICLES

Les rédacteurs du CJO*RCO vous encouragent à leur soumettre vos articles cliniques. Contactez info@opto.ca pour plus de renseignements.

Our Vision of Vision Health: the National Coalition for Vision Health

Notre vision de la santé oculaire : la Coalition nationale en santé oculaire

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Are you aware that Canada's population is aging? This process will start to accelerate in 2011, when the first baby boomers (born in 1946–1965) turn 65 years old. By 2031, approximately 24% of the population will be over the age of 65.[1] The vision health care workforce will not be able to keep pace with the demand for its services. The ratio of ophthalmologists to patients over 65 alone is projected to rise from 1:4301 to 1:7576 in the next 14 years.[2] Canada is headed for a potential epidemic of age-related eye disease. Avoidable vision loss will increase dramatically.

Vision loss is a serious and costly health issue that will result in enormous personal suffering and tremendous economic impact unless we intervene. The annual direct and indirect vision health costs in Canada are estimated at $8 billion, ballooning to over $15 billion if one includes the loss of well-being. Vision loss is the most feared disability, according to an Environics poll.[3] Vision loss ranks with cancer as one of the two most feared health conditions. The consequences of vision impairment prevent healthy and independent aging: social dependence increases, the risk of falls and the mortality rate double, the risk of depression triples, and the risk of hip fractures quadruples.

The National Coalition for Vision Health (NCVH) believes that developing and implementing a Vision Plan for Canada—a plan of action to promote vision health and prevent avoidable blindness in Canada—is the key to averting this vision loss crisis. What is NCVH? It is an organization of associations that share a common interest in eye care and vision research. The Coalition provides national leadership on Canada's vision health issues and in the development of related public policy. NCVH accomplishes its goals through the mandates of its member associations by consultation, collaboration, advocacy, research, education, and service. The Coalition believes that all Canadians are entitled to full and equal access to eye care. Members include the Canadian Institutes of Health Research (Institutes of Neurosciences, Mental Health, and Addiction), Canadian National Institute for the Blind, Canadian Ophthalmological Society, Foundation Fighting Blindness–Canada, Canadian Association of Optometrists, Opticians Association of Canada, Vision Health Research Council of Canada, and a participant observer from the Centre for Chronic Disease Prevention and Control (CCDPC), and Public Health Agency of Canada.

In looking to achieve its mandate, NCVH hosted a 1.5-day workshop in Toronto this past February to develop a national plan of action for the promotion of vision health and the prevention of avoidable blindness in Canada. Invited participants included academics, clinicians, researchers, nongovernment organizations, and representatives from the federal and provincial governments, as well as international guests from Australia, the United Kingdom, and the United States.

The keynote speaker was Professor Hugh R. Taylor, Managing Director of the Centre for Eye Research Australia, speaking on De-

GUEST EDITORIAL
ÉDITORIAL INVITÉ

veloping a National Eye Health Plan for Australia—Lessons Learned.[4]

NCVH, with funding from the Public Health Agency of Canada, commissioned a comprehensive, evidence-based background document from Drs. Buhrmann and Hodge, clinician/epidemiologists at the University of Ottawa (Ottawa, Ont.), which would focus on information relevant to building a framework for action for vision health. Drs. Buhrmann and Hodge produced Foundations for a Canadian Vision Health Strategy.[2] This document, together with Synthesis of Responses to a Pre-workshop Consultation,[5] a document that drew freely from the Australian Vision Plan Framework and had been previously reviewed by members of the vision community, was used to kick-start the discussions. These documents can be found on the NCVH Web site (*http://www.visionhealth.ca*).

Workshop participants were unanimous in their support for the concept of a National Vision Plan. Participants agreed that the plan should be comprehensive, cohesive, coordinated, and inclusive, containing action areas that would have the potential to lead to the prevention of avoidable blindness. Components of such a plan would include (i) *reducing the risk of eye disease and eye injury through health promotion and increased public awareness*; (ii) *increasing early detection of disease through public and professional education and the development of early detection protocols*; (iii) *improving access to eye health and rehabilitation services*; (iv) *promoting excellence in vision health outcomes*; and (v) *expanding and improving the knowledge base through research, surveillance, and knowledge translation*. The recommendations of the workshop participants are contained in the Workshop Report.[6]

NCVH is asking the federal government to endorse the creation of a Vision Plan for Canada and allocate dedicated human resources and financial assistance to a Vision Program with its own Secretariat. All federal government vision initiatives could then be centralized within the Vision Program. The Secretariat would work with NCVH and vision stakeholders to help develop the Vision Plan for Canada and to obtain the input and support of the provinces and territories, a necessary step if such a plan is to be implemented.

In recent months, members of NCVH have met with Mr. Steven Fletcher, Parliamentary Secretary for Health; policy advisors of the Office of the Minister of Health and Mr. Ian Clark, Departmental Assistant, Office of the Minister of Health; Mr. Tim Hutchinson, Director, CCDPC, Public Health Agency of Canada; and Ms. Kim Elmslie and Ms. Barbara Foster, who are also of CCDPC. We are now scheduling meetings with members of the House of Commons Standing Committee on Health and with the Expert Group Panel, CCDPC, to raise the profile of vision in Canada and to enlist their support in moving our agenda forward. The responses to date have been positive.

Why is it that politicians seem oblivious to the fact that patients prize vision and fear vision loss? A vision plan for Canada is a nonpartisan issue with the potential to improve the quality of the lives of all Canadians. The success of our initiative will ultimately be determined by the prevailing political will. We can influence political will by raising the profile of vision in Canada; by educating politicians, both federal and provincial, about the looming vision crisis in Canada; and by asking what can be done to promote vision health and prevent avoidable blindness.

Êtes-vous conscients que la population du Canada vieillit? Ce processus commencera à s'accélérer en 2011, lorsque les premiers baby-boomers (nés entre 1946-1965) auront 65 ans. En 2031, environ 24 % de la population aura 65 ans ou plus[1]. La main-d'œuvre en santé oculaire ne fournira plus à la demande. Dans les 14 prochaines années[2], le rapport d'ophtalmologistes aux patients de plus de 65 ans seulement devrait passer de 1:4301 à 1:7576. Le Canada se dirige vers une épidémie potentielle de maladies de l'œil liées au vieillissement. Il y aura une croissance vertigineuse de la perte de vision évitable.

La perte de vision est un problème de santé sérieux et coûteux qui entraînera des souffrances personnelles énormes et une incidence économique gigantesque si nous n'intervenons pas. On estime que les coûts annuels directs et indirects en santé oculaire au Canada sont de 8 milliards de dollars, et de plus de 15 milliards de dollars si nous incluons la perte de bien-être. Selon un sondage d'Environics[3], la perte de vision est le handicap le plus redouté. Les deux problèmes de santé les plus redoutés sont la perte de vision et le cancer. Les troubles de vision gênent le vieillissement en santé et

autonome : la dépendance sociale s'accentue, le risque de chute et le taux de mortalité doublent, le risque de dépression est trois fois plus important et le risque de fracture de la hanche, quatre fois plus important.

La Coalition nationale en santé oculaire (CNSO) croit que l'élaboration et la mise en place d'une stratégie de la vision pour le Canada – un plan d'action pour promouvoir la santé oculaire et prévenir la cécité évitable – sont la clé pour éviter cette crise de la perte de vision. Qu'est-ce que la CNSO? C'est un organisme regroupant des associations qui ont un intérêt commun dans les soins oculo-visuels et la recherche sur la vision. La Coalition exerce un leadership national au Canada dans les questions de santé oculaire et dans l'élaboration de politiques publiques pertinentes. La CNSO réalise ses buts grâce au mandat de ses associations membres de même que par la consultation, la collaboration, la promotion, la recherche, l'éducation et le service. La Coalition croit que tous les Canadiens ont droit à un accès égal et complet à des soins oculo-visuels. Les membres de la Coalition incluent les Instituts de recherche en santé du Canada (Instituts des neurosciences, de la santé mentale et des toxicomanies), l'Institut national canadien pour les aveugles, la Société canadienne d'ophtalmologie, la Fondation lutte contre la cécité – Canada, l'Association canadienne des optométristes, l'Association des opticiens du Canada, le Conseil de la recherche en santé de la vision du Canada, un observateur participant du Centre de prévention et de contrôle des maladies chroniques (CPCMC) et l'Agence de la santé publique du Canada.

Pour réaliser son mandat, la CNSO a organisé un atelier de travail de un jour et demi à Toronto en février dernier afin d'élaborer un plan d'action national de promotion de la santé oculaire et de prévention de la cécité évitable au Canada. Parmi les participants invités, il y avait notamment des universitaires, des cliniciens, des chercheurs, des organismes non gouvernementaux et des représentants des gouvernements fédéral et provinciaux, de même que des invités de l'Australie, du Royaume-Uni et des États-Unis.

Le conférencier de marque a été

le professeur Hugh R. Taylor, directeur général du Centre for Eye Research d'Australie, qui a traité des leçons apprises de l'élaboration d'un plan national en santé de l'œil pour l'Australie[4].

La CNSO, grâce à un financement de l'Agence de la santé publique du Canada, a commandé aux Drs Buhrmann et Hodge, cliniciens-épidémiologistes à l'Université d'Ottawa (Ottawa, Ont.), un document d'information factuel global qui ciblerait l'information pertinente à l'élaboration d'un cadre d'action en santé oculaire. Les Drs Buhrmann et Hodge ont produit un document sur les bases d'une stratégie canadienne en santé oculaire[2]. Ce document, joint à la synthèse des réponses données lors d'une consultation précédant l'atelier[5], un document qui s'inspire librement du cadre du plan de vision australien et qui avait été d'abord revu par des membres de la collectivité visuelle, a servi de point de départ aux discussions. On peut trouver ces documents sur le site Web de la CNSO (*www.visionhealth.ca*).

Les participants de l'atelier ont tous soutenu le concept d'un plan de vision national. Selon eux, le plan devrait être global, cohérent, coordonné et inclusif, et contenir des secteurs d'action susceptibles de mener à la prévention de la cécité évitable. Voici les composantes d'un tel plan : (i) *réduire le risque de maladies de l'œil et de blessures de l'œil grâce à la promotion de la santé et à une sensibilisation publique accrue*; (ii) *accroître le dépistage précoce de maladies grâce à l'éducation publique et professionnelle et à l'élaboration de protocoles de dépistage précoce*; (iii) *améliorer l'accessibilité aux services de santé oculaire et de réadaptation*; (iv) *promouvoir l'excellence des résultats en santé oculaire*; et (v) *diffuser et améliorer la connaissance grâce à la recherche, à la surveillance et au transfert des connaissances*. Les recommandations des participants de l'atelier se trouvent dans le *Rapport de l'atelier* [6].

La CNSO demande au gouvernement fédéral d'appuyer la création d'un plan de vision pour le Canada et d'allouer des ressources humaines et financières à un programme de vision doté de son propre secrétariat. Toutes les initiatives du gouvernement fédéral en matière de vision pourraient alors être centralisées dans ce programme de vision. Le secrétariat travaillerait avec la CNSO et les intervenants du domaine de la vision à l'élaboration d'un plan de vision pour le Canada et chercherait à obtenir l'apport et le soutien des provinces et des territoires, une étape nécessaire à la mise en place d'un tel plan.

Depuis quelques mois, des membres de la CNSO ont rencontré M. Steven Fletcher, secrétaire parlementaire à la Santé; des conseillers politiques du ministre de la Santé et M. Ian Clark, adjoint ministériel, bureau du ministre de la Santé; M. Tim Hutchinson, directeur, CPCMC, Agence de la santé publique du Canada; Mme Kim Elmslie et Mme Barbara Foster, toutes deux du CPCMC. Nous préparons actuellement des rencontres avec les membres du Comité permanent de la santé de la Chambre des communes et du Groupe d'experts du CPCMC, afin de promouvoir le profil de la vision au Canada et d'obtenir leur appui à la réalisation de notre programme. Jusqu'à maintenant, les réponses ont été positives.

Pourquoi les politiciens semblent-ils ignorer le fait que les patients prisent la vision et craignent de la perdre? Un plan de vision pour le Canada est une question non partisane qui peut potentiellement améliorer la qualité de vie de tous les Canadiens. La réussite de notre initiative dépendra ultimement de la volonté politique. Nous pouvons influencer la volonté politique en faisant la promotion de la vision au Canada, en éduquant les politiciens fédéraux et provinciaux au sujet de la crise oculaire imminente au Canada, et en demandant ce qui peut être fait pour promouvoir la santé oculaire et prévenir la cécité évitable.

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Working in the Margins

Alphonse Carew
BSc, OD, MBA

Do you know that not every dollar made in your practice has the same value? The last dollars you make are worth a lot more to you than you may realize.

Let's look at a simple model for a practice that makes $300,000 in gross revenue, has $100,000 in expenses for goods (frames, lenses and contact lenses) and $100,000 in general expenses leaving $100,000 for net income.

Gross	$300,000	
Cost of Goods	$100,000	
Contribution Margin	$200,000	67%

Expenses	$100,000	
Net Income	$100,000	33%

The two fixed (or nearly fixed) figures in this example are the expenses at $100,000, and the contribution margin at 67%. At first glance one might think that for every dollar made in this practice 33% of it turns into net income but that's not exactly what happens.

Before your practice can make any income it needs to reach its break-even point. Up until this stage every dollar in gross income goes to cover your expenses, and nothing is left over. To calculate this breakeven point, divide your expenses (which we are assuming are all fixed for this simple model) by the contribution margin percentage. In this example it is $100,000 in expenses divided by 67% or $150,000.

Here's how it would look like on your income statement.

Breakeven

Gross	$150,000	
Cost of Goods	$ 50,000	
Contribution Margin	$100,000	67%
Expenses	$100,000	
Net Income	$ 0	0%

Producing $150,000 in gross revenue allows you to pay your suppliers and your expenses without anything left over. Thankfully, except for early start-up practices this typically is not a concern for most optometric practices.

Above the breakeven point, your general expenses are fully covered and the next dollars that are made only have the Cost of Goods expenses tied to them. Therefore in our example each dollar after breakeven is worth 67% in net income. By example, let's say we make $100,000 more in gross revenue, then the net income will be 67% of this or $66,667.

Gross	$250,000	
Cost of Goods	$ 83,333	
Contribution Margin	$166,667	67%
Expenses	$100,000	
Net Income	$ 66,667	27%

You can easily see why it is beneficial to produce more and more gross income while keeping the practice's expenses the same. After the breakeven point a higher percentage of gross becomes net income.

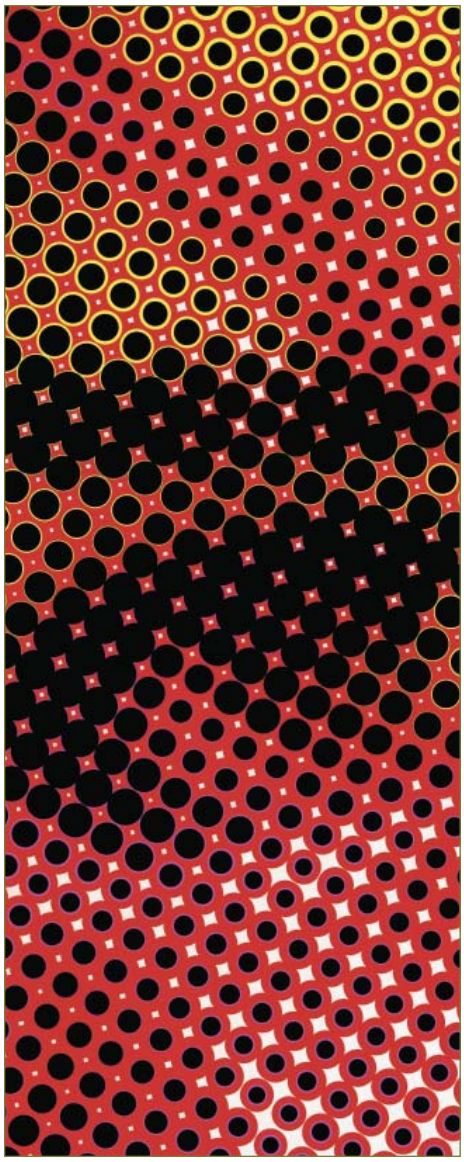
This is overly simplified because at some point to produce more gross revenue you will likely have to increase expenses with more staff, or a larger space, but if you can keep there increases in expenses to a minimum you can benefit greatly from higher margins on the last dollars you make.

For optometric practices, there is another twist to the story. The contribution margin of 67% in this example is not a homogeneous figure, meaning it is derived from two separate revenue streams, in that we sell goods as well as provide services. For the most part the provision of services has no "Cost of Goods" tied to it. So if you can increase the price of services, or expand the services you provide the increase in revenue falls to the bottom line at a rate of 100%. Above breakeven, for every dollar you can increase your services a dollar falls to net income! If you have the ability, increasing your fees for services, or adding services can have a larger impact on the profitability of your practice than anything else.

Let go of the mindset that your practice produces an equal amount of income for each dollar it makes. The last dollars are worth far more than first ones and more importantly if you can move your gross revenue much higher past breakeven you will benefit greatly from these marginal dollars.

Bioart: Biotechnology and Art

Bioart : Biotechnologie et art



Art has been historically associated with cultural and technological changes in society.

Recently imaging, genetics and new biological sciences have been utilized in what is known as Bioart.

Visual science digital imaging, photonics, genomics, tissue engineering, and cloning utilize colored pixels.

The visual scientist, biologist, geneticist, eyecare practitioner and artist work with a variety of bio-technology images. These images may be considered as an inspiration for Bioart.

Internet references to some ophthalmic digital technology sites are provided. The Optometrist may view digital ocular diagnostic and therapeutic images with an appreciation of its aesthetics.

L'art a de tout temps été associé aux changements technologiques et culturels d'une société.

Récemment, on a utilisé l'imagerie, la génétique et les nouvelles sciences biologiques dans ce qu'on appelle le bioart.

L'imagerie numérique, la photonique, la génomique, l'ingénierie cellulaire et le clonage utilisent des pixels colorés.

Le scientifique, le biologiste, le généticien, le praticien des soins de la vue et l'artiste visuels travaillent avec une diversité d'images biotechnologiques qui peuvent être considérées comme une inspiration pour le bioart.

On fournit des liens vers des sites Internet de technologie numérique ophtalmique. L'optométriste a la possibilité de voir des images numériques de diagnostic et de thérapie oculaires dont il peut apprécier le caractère esthétique.

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Keywords: Bioart, biotechnology, genomics, bio-photonics, imaging, art, culture.

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INTRODUCTION

Bioart is an art practice in which the medium is living matter and the "works of art" are produced in laboratories and/or artist's and designers studios. The tool is biotechnology, which includes such technologies as genetic engineering and cloning. The materials used by Bioartists are cells, DNA molecules and living tissue.[1]

Bioart comprises:

1. Cloning Technologies
2. Transgenics (Genetic Engineering)
3. Tissue Engineering
4. Human Genome Project/Reproductive Technologies

Bioart may utilize diagnostic and therapeutic imaging in medicine and Optometry. References to ophthalmic internet web sites are provided for the artistic appreciation of ocular imaging.

BIOART AND GENOMICS

Historically art depicting living animals has been known since the prehistoric times. Leonardo Da Vinci is an example of a bioartist. He was a scientist, technologist and artist who combined art and biotechnology in his human anatomical sketches.[2]

More recently, Frank Netter, MD (1906-1991) produced numerous medical illustrations in his books and Clinical Symposia.[3] Today, ocular imaging has replaced some anatomic and physiological artistic illustrations.

One recent source of biological information is genomics, the study of an organism's entire genome. It determines the entire DNA sequence of organisms and fine-scales genetic mapping. Study of the full set of proteins in a cell type or tissue and the changes during various conditions, is called proteomics. Genomics was developed in the 1990's with genome projects.[4] Proteomics and genomics are used as a source inspiration for Bioart.

The first genetically hybrid life forms exhibited in art were Edward Steichen's "Delphiniums" in 1936. This introduced genetics into the art world.

Eduardo Kac is a transgenic artist .[5] One of his works, titled "Genesis", could permit viewers to activate genes derived from bacteria under ultraviolet (UV 488 nm) light causing genetic mutations. He obtained some genes from a laboratory, implanted them into a bacteria which then grew in a petri dish under UV light.

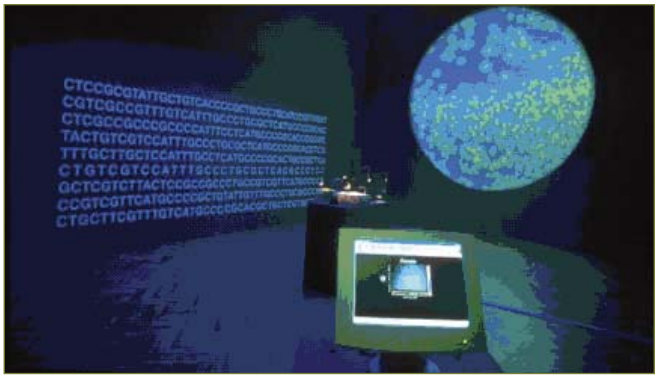

Figure 1. GENESIS. Eduardo Kac[5]

"Genesis is a transgenic artwork that explores the intricate relationship between biology, belief systems, information technology, dialogical interaction, ethics, and the Internet. The key element of the work is an "artist's gene", a synthetic gene that was created by Kac by translating a sentence from the biblical book of Genesis into Morse Code, and converting the Morse Code into DNA base pairs according to a conversion principle specially developed by the artist for this work. The sentence reads: "Let man have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moves upon the earth." It was chosen for what it implies about the dubious notion--divinely sanctioned--of humanity's supremacy over nature. Morse code was chosen because, as the first example of the use of radiotelegraphy, it represents the dawn of the information age--the genesis of global communication. The Genesis gene was incorporated into bacteria, which were shown in the gallery. Participants on the Web could turn on an ultraviolet light in the gallery, causing real, biological mutations in the bacteria. This changed the biblical sentence in the bacteria. After the show, the DNA of the bacteria was translated back into Morse code, and then back into English. The mutation that took place in the DNA had changed the original sentence from the Bible.

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The mutated sentence was posted on the Genesis web site. In the context of the work, the ability to change the sentence is a symbolic gesture: it means that we do not accept its meaning in the form we inherited it, and that new meanings emerge as we seek to change it." (5)

Alba, another work by Eduardo Kac "created a green fluorescent rabbit created with an enhanced version (i.e. synthetic mutation) of the original wild-type green fluorescent gene found in the jellyfish Aequorea Victoria."[5] The rabbit glows green under a specific ultraviolet light (maximum 488nm).

Figure 2. ALBA. Eduardo Kac[5]

ARTIFICIAL LIFE

Another use of biology in art is the use of artificial-life art software imitating some aspect of biology. It was developed in the early 1990's. Artficial genetics and mutations allowed the viewer to interact with stereoscopic creatures and ecosystems. Life spacies is an artificial life environment applying genetics, mutation, breeding and evolution to artworks. Life spacies can translate written text into a genetic code of a virtual creature. Form, shape, colour, texture and the number of body limbs can be created through interaction with the program. Christa Sommerer and Laurent Mignonneau' s Life Species II Modeling Complexity for Interactive Art is an example of this art form.[6]

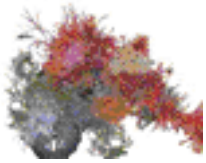

Figure 3. Life Spacies. 1997. Sommerer Mignonneau[6]

OTHER FORMS OF BIOART

Joe Davis at the department of Biology at MIT uses Molecular Biology and bioinformatics in his Bioart.[8] Using genetic engineering he inserted some encoded DNA into E. coli bacterium. This pioneering work was influenced by Eduardo Kac's Genesis.

Some artists such as Natalie Jeremijenko used Cloning to create life as artwork. She demonstrated cultural and environmental differences in 100 cloned trees.

Gunther von Hagens has developed preserved human body sculptures using Plastination to teach lay people about anatomy of the human body, its functions, diseases and physical changes.[7]

IMAGING

Biophotonics deals with the interaction of organic materials with light and other forms of radiant energy. Computer technology, video and imaging using optics, lasers, imaging, fibre-optics, electro-optics and photonics make up the term Photonics. This includes the emission, detection, absorption, deflection, selection, modification and creation of radiation by and from all living organisms and organic materials. Biophotonics has many applications in the fields of medicine, genetics, biology, agriculture and environmental science.[8]

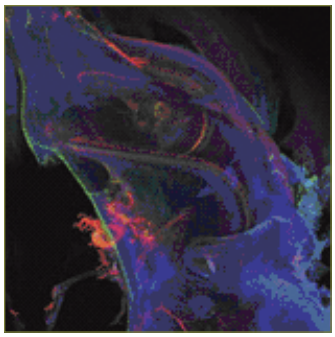

Figure 4. Biophotonics. Cochlea[9]

The Bioartist can draw upon many ocular imaging sources as an inspiration for Bioart. Imaging using colour coded pixel, 3-D imaging, etc. produces topographic images of the surface of the eye, the anterior and posterior segments.[9]

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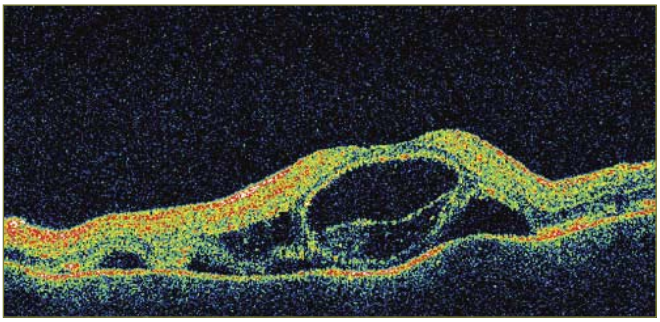

Figure 5. Age Related Macular Degeneration. Stratus OCT. Zeiss Meditec.[16]

Imaging such a tear ferning, thermography, fluorescence, live-cell imaging, corneal topography, ultrasonic biomicroscopy, ultrasound, Scheimpflug lens imaging, optical coherence tomography (OCT), 3-D Confocal microscopy, retinal nerve fibre analysis, endoscopy, brain imaging (MRI,PET,CT scans, etc.), biomarkers, holography, and doppler retinal blood flow may be sources of Bioart.

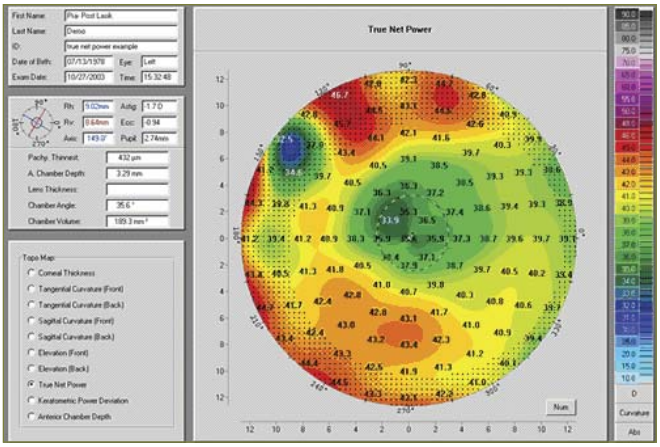

Figure 6. Corneal Topography. Oculus Pentacam[20]

Figure 7. Intraocular Imaging. Dicon Module. Zeiss Meditec[16]

OPHTHALMIC SOURCES OF BIOART

The National Eye Disease Genotyping Network (eyeGENE -NEI)) and the National Human Genome Research Institute (NIH) also provides information and images which may be used by the Bioartist.[9,10] More than 30,000 genes involved in the function of the human body have been found in a single human cell. The information obtained from genetic (DNA) analysis has the potential to revolutionize the diagnosis, prevention and treatment of human diseases. Genetic analysis is also used for identifying drug-resistant strains and tailoring individual treatments.

The Bioartist uses a multitude of vision perception techniques involving form, colour, stereopsis, contrast sensitivity, figure-ground., peripheral versus central vision, motion, etc. Many studies of visual perception published in the Journal of Vision may explain the basis of visual effects utilized in Bioart.[11]

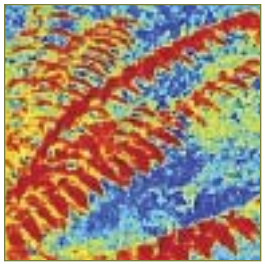

Figure 8. Hansen and Hess, *Journal of Vision*[11]

CONCLUSION

Bioartists all have a tendency towards:

1. Reminding people about the ever-present complexities of vitality, mortality and mutation all around us.
2. Giving non-experts the ability to speak intelligently about science without having to be a scientist.
3. Providing hands-on labs or exhibitions designed to get rid of fears of complexity while maximizing debates on intelligent applications of technology.
4. Exhibiting works which rework preconceptions about relationships among human culture, other living beings and the environment.[12,13]

Bioart utilizes human, animal and virtual reality images and biotechnology techniques on the internet or in museums to create life-like artworks linking biology and art. Genetic art seeks "to break down the psychic and physical barriers between art and living reality". The artists

use the control of biology for the good of humanity. Bioart relocates humanity within the complex ecological systems of life.[13]

ACKNOWLEDGEMENTS

The author would like to acknowledge the assistance of Professor Ernestine Daubner, Fine Arts department, Concordia University, Montreal, Qc.

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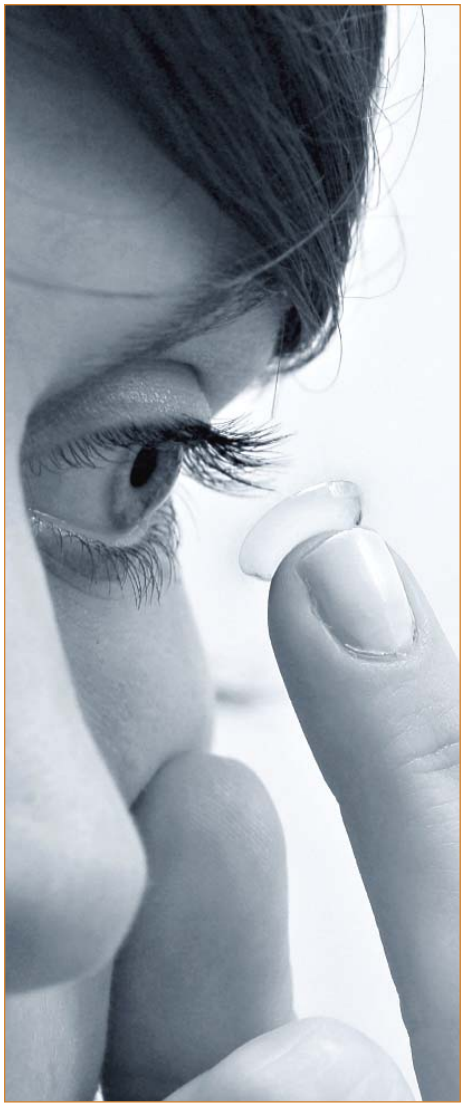
On January 1, 2008,

THOMAS F. FREDDO, O.D., PH.D., F.A.A.O.

assumed the Presidency of the International Society for Eye Research www.ISER.org. He was elected in 2006 and has served the past two years as President-Elect. He is the first optometrist to lead this international organization. ISER was founded in 1968 under the leadership of Dr. Endre Balazs who developed the first clinical viscoelastic – Healon. The mission of the International Society for Eye Research is to support, sustain and propagate excellent eye research throughout the world. This is achieved by enhancing international communication and collaboration, by providing a forum for dissemination of information among eye researchers and by developing and sustaining the skills and resources of the eye research community. ISER holds a biennial meeting. Its next meeting will be held in Beijing, China, September 24-29, 2008. The 2010 meeting will be held in Montreal, July 18-23, 2010. ISER also sponsors the highly-regarded journal Experimental Eye Research and Dr. Freddo currently serves as an Executive Editor for this journal.

Dr. Freddo currently serves as Professor and Director of the School of Optometry at the University of Waterloo in Ontario. Prior to 2006, he had served as Professor and Vice-Chairman for Research in the Department of Ophthalmology at Boston University School of Medicine. Dr. Freddo has served on the Board of Directors of the American Academy of Optometry and on the Long-Range Planning Committee for the Association for Research in Vision and Ophthalmology. He is a former Ezell Fellow and a recipient of the Glenn A. Fry Award from the American Optometric Foundation.

The School of Optometry Celebrates the Success and Generosity of the Centre for Contact Lens Research



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In 1988 the Centre for Contact Lens Research (CCLR) was established at the UW School of Optometry, with a mandate to become an international leader in contact lens research. They would accomplish their goal by partnering with industry to conduct research on contact lenses with an emphasis on studying the ocular response.

No one could have predicted the unprecedented success the CCLR has achieved over the last 20 years, and the international reputation for excellence in research and clinical trials they have gained. The CCLR is now an organization made up of 47 individuals, including 4 faculty members, 10 researchers, 22 technical and administrative support staff and 11 graduate students. This strong team conducts leading edge research on ocular and visual function and evaluates prototypes and marketed products in clinical trials and laboratory based studies. With extensive research expertise and their impressive publication record, it is no wonder that the CCLR is a source of tremendous pride for the UW School of Optometry.

This point was further emphasized when the CCLR announced that they will make a leadership commitment of $500,000 to the School's expansion and renovation campaign, in honour of their 20 years of research success. This extraordinary support is one of the largest gifts

the School has ever received and is a symbol of the special relationship we share with the CCLR.

The School was able to first recognize their donation on June 8, 2007, during our annual continuing education weekend. CCLR Director, Dr Desmond Fonn took part in the sod turning ceremony of Optometry's new teaching addition (seen in photo), in acknowledgement of not only their remarkable support but also Dr. Fonn's leadership role as a campaign volunteer. With over 450 people in attendance, the School also marked its 40th Anniversary since moving to Waterloo in 1967, saw the passing of TPA legislation in Ontario and honoured the generosity of all of our alumni, corporate partners and friends. It was definitely a day of milestones and celebration for the School of Optometry.

It is with great pleasure that the UW School of Optometry thanks the Centre for Contact Lens Research for standing by us during this time of growth and need. With the CCLR's support, the School has now raised $6.5 million toward our new fundraising goal of $12.4 million. Through the generosity of our supporters, construction of this ambitious project is now underway and can be seen by visiting www.optometry.uwaterloo.ca/expansion.

Thank you CCLR for your continued support and Congratulations on 20 years of success.

2007 Report to the Optometric Leaders Forum from the Vision Institute of Canada

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The Vision Institute of Canada was originally established in 1981 as an optometric resource centre for the profession where practitioners could refer difficult cases for second opinions, for access to specialized instruments and equipment which were not the standard of care in most offices at the time, to be an educational resource for the profession, and to provide charitable vision care services to members of the public with financial or other special needs.

The Institute was started with the financial assistance of the College of Optometrists of Ontario, the Ontario Association of Optometrists, and the School of Optometry in Waterloo. It is a multi-disciplinary clinic with four fully functioning exam rooms, a low vision centre, library and dispensary. It has a combined full and part-time staff of eight people and accommodates over 4000 patient visits a year. Its main clinical focus is pediatrics, low vision, and specialized contact lens care. The Institute also provides a student internship program to as many as twelve final year optometry students every year. These students stay for three months each and under the clinical supervision of Institute staff, are exposed to very challenging patients and cases.

The Institute also provides vision care services to over 20 nursing homes and chronic care facilities in the Greater Toronto Area.

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These programs are for the most part charitable since the remuneration from OHIP or from the dispensing of ophthalmic appliances does not cover the true cost of providing this service. We also continue to operate a program providing free comprehensive eye examinations at the clinic to the many women and children living in family shelters in the Greater Toronto Area in association with shelters that are run by the YWCA. This program exposes and sensitizes our clinical interns to the issue of domestic abuse. It is also an opportunity for the Institute to get more involved in community and social action around a very vulnerable segment of our society that has become more at risk since the de-insuring of eye exams for persons aged 20 to 64. We also receive and accept numerous referrals of clients from various social service agencies who are in need of vision care services but cannot afford them.

The year 2007 has been a very successful year for the Institute. Our donation program and corporate sponsorship, together with revenues from our continuing education programs and conferences allowed the Vision Institute to again successfully balance its budget for the year. We are also grateful to the Canadian Optometric Education Trust Fund for its second year of funding our program of Vision Services for Family Shelter Residents.

In 2007 the Board of Directors of the Institute approved a research project to look at the delivery of Optometric Vision Care Services to Aboriginal Communities in Canada. The purpose of this project over the next two years will be to determine the level of optometric vision care services being provided to our native communities and establish a basis for out-reach programs to those communities that are in the greatest need of care. There have been no studies done, to the best of our knowledge, on the level of optometric care or the amount of uncorrected refractive error in our aboriginal populations on reserve. We will host an Aboriginal Vision Health Conference in Ottawa in May, 2010, to present the results of this study with an overview of issues related to vision and eye health in Canadian aboriginal communities. Dr. Barbara Robinson, OD, MPH, PhD, from the University of Waterloo has partnered with us in the development this program. The support of our Canadian and provincial associations would be very welcomed.

The Vision Institute hosted two very successful continuing education conferences in 2007. In May, we held a 10-hour Anterior Segment Disease and Treatment Course which included a two hour Glaucoma Management Course presented by Dr. Paul Karpecki. This was hosted for our Northern Ontario colleagues, in Sudbury, Ontario, on May 12th and 13th, 2007 at the Radisson Hotel and Conference Centre. It was followed by a two-hour hands-on workshop featuring Heidelberg Retina Tomography in the assessment of glaucoma.

On November 2nd, 3rd, and 4th, 2007, the Institute hosted a 20 Hour TPA Refresher Course with Dr. Ron Melton and Dr. Randall Thomas who brought their 20-hour Current Therapy in Ocular Disease Course

to the Hilton Suites Hotel and Conference Centre in Markham, Ontario. This was held in affiliation with the Pennsylvania College of Optometry and met the educational requirements of the College of Optometrists of Ontario as a 20 hour TPA Refresher Course for members to prescribe drugs. The program was sold-out with 458 practitioners in attendance. The Trade Show was very well attended and featured over 30 suppliers from the vision care industry.

In 2007, the Vision Institute made a stakeholder submission to the College of Opticians of Ontario in response to their Proposed Standard of Practice for Optician Performed Refraction. We were concerned that their proposed standard did not include the important provision that refraction by opticians only be performed under the direct in-office supervision of the prescribing doctor. This requirement for direct supervision is the position of the College of Optometrists and the College of Physicians and Surgeons of Ontario. The optician's proposed standard would put the public at a risk of harm. The Institute's submission can be viewed on our web-site.

In 2008, the Institute will be hosting two national conferences. Several very prominent experts in the field of nutrition and vision have accepted an invitation to speak at a symposium, to be held in Calgary, Alberta on May 31st and June 1st, 2008. This two-day continuing education program will be directed towards optometrists, dietitians, physicians, and other healthcare professionals interested in nutrition and vision. It will cover topics such as diabetic and hypertensive retinopathy, macular degeneration, juvenile-onset myopia, and other nutrition-related diseases with a focus on vision and eye health. Speakers include Dr. Steven Pratt, MD, an ophthalmologist and world-renowned authority on the role of nutrition and lifestyle in the prevention of disease, and author of the best selling-book SuperFoods Rx; Dr. Loren Cordain, PhD, a leading expert on the diet of paleolithic cultures and author of The Paleo Diet and The Paleo Diet for Athletes; and Dr. Stuart Richer, OD, PhD, principal investigator of the Veterans Lutein Antioxidant Supplementation Trial (LAST) on lutein and macular degeneration. There will be a Nutraceutical Trade Show, Book Fair, and an Ocular Imaging Workshop. Dr. Cordain will present the keynote lecture: Origins and Evolution of the Western Diet: Health Implications for the 21st Century based on his February 2005 paper in the American Journal of Clinical Nutrition.

This Nutrition and Vision symposium will come to Toronto on November 7th, 8th, and 9th, 2008 as part of our 20 Hour CE Annual Fall Conference and Trade Show. We will also feature Dr. Louis J. Catania, OD, presenting a variety of lecture topics related to therapeutic pharmaceutical agents in optometric practice. This three-day program will be held at the Hilton Suites Hotel and Conference Centre in Markham, Ontario.

The Vision Institute will have completed by November 2008, a patient-education pamphlet on Nutrition and Vision for optometrists to give to their patients.