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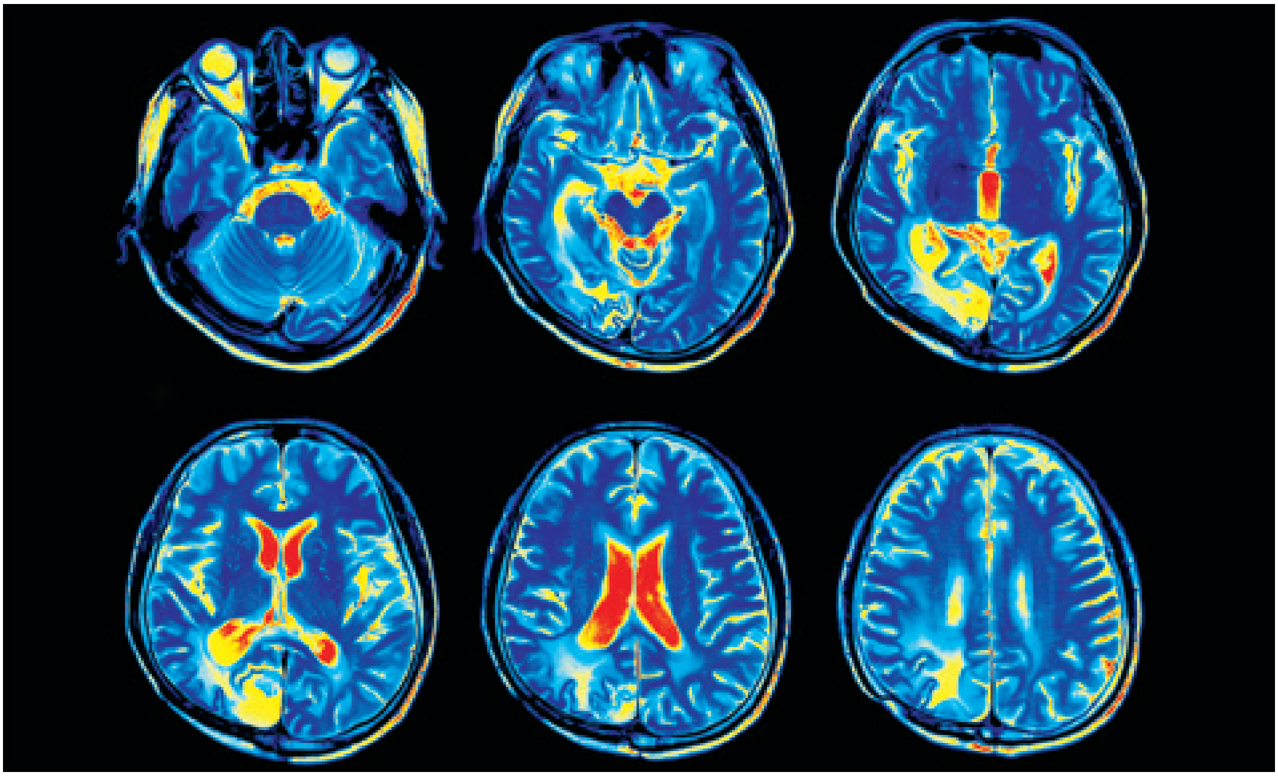

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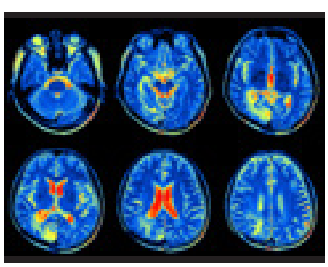

On the Cover

Visual symptoms are observed in 75% of TBI cases.

Stanley Woo, OD, MS, MBA, FAAO
Director
Guest Editor

It is my great honor and privilege to serve as the Director of the School of Optometry and Vision Science at the University of Waterloo. Having grown up in Waterloo I have many fond childhood memories of being around the School, faculty, staff, and students. My return has felt like homecoming after spending 27 years in the United States. The School continues to be a fascinating place with wonderful people, exceptional patient care, top notch education and world class research.

Most recently, I served as Dean of the Southern California College of Optometry (SCCO) as it underwent a transformation from an independent, private, non-profit College into a Health Professions University. Under the visionary leadership of Pres. Kevin L. Alexander and the Board of Trustees, SCCO evolved into Marshall B. Ketchum University with the addition of a School of Physician Assistant Studies and a College of Pharmacy. The commitment and resolve to develop an institution with optometry as an integral part of primary health care was nothing short of astounding, and included the addition of Ketchum Health as an incubator to explore collaborative practice models.

Optometry is on the front line of eye and vision care, and is an integral partner in interprofessional teams. Interprofessional teams are groups of healthcare professionals that work collaboratively to enhance patient centered care. These teams were initiated by the Ontario Ministry of Health and Long Term Care to better meet the needs of our aging population, by improving service integration and co-ordination of different health professions. Through interprofessional education and collaborative practice (IPE/IPC), the School of Optometry and Vision Science promotes opportunities for students to learn about the expertise and values of other health providers while also developing an increased awareness, and understanding of the role optometry plays within interprofessional healthcare.

At the Health Sciences Campus in Downtown Kitchener's Innovation District, we have the foundation in place to further develop and promote interprofessional education and collaborative practice. Our own Health Sciences Optometry Clinic (HSOC)[1], the Michael G. DeGroote School of Medicine Waterloo campus[2], the Centre for Family Medicine[3], and the UW School of Pharmacy[4] are all located in close proximity.

I have been impressed by the level of activity in IPE/IPC at the University of Waterloo. Opportunities abound for students in different health professions to learn from one another, socialize together, share cases, and ultimately provide improved quality of care and patient outcomes.

Highlights of IPE/IPC activities include:

- Annual Interprofessional Showcase: Sponsored by the Interprofessional Educators Collaborative (IPEC) of Waterloo Wellington, cases with multi-media resources are reviewed and presented by teams with faculty facilitators such as nursing, pharmacy, optometry, EMT, police, fire, social work, occupational therapy . Each profession provides a perspective on their approach while sharing self-reflection and insights gained about other professions.

- Eye Day: Optometry faculty, local ophthalmologists, and optometry students provide a skills workshop for medical residents rotating through the Center for Family Medicine. Skills taught include ophthalmoscopy, Tonopen, and slit lamp biomicroscopy, highlighting the collaboration between optometry and ophthalmology.

- IPE Day: Hosted by the SouthWestern Ontario Academic Health Network (SWAHN) first year medicine, dentistry, pharmacy, nursing, optometry and social work students participate in facilitated case discussions and listen to keynote addresses by a patient/care provider panel.

- Vision and Aging Week: Collaborative week between four 2nd year medical students and four 4th year optometry students. Hosted by the SouthWestern Ontario Academic Health Network (SWAHN) first year medicine, dentistry, pharmacy, nursing, optometry and social work students participate in facilitated case discussions and attend keynote addresses by a patient/care provider panel.

The Canadian Interprofessional Health Collaborative developed a competency framework in 2010 to help guide curriculum development and assessment of outcomes.[5] My own experience has been informed through the work of the American Schools and Colleges of Optometry membership with the Interprofessional Education Collaborative (IPEC)[6] and the faculty development institute. The four core IPEC competencies include:

- **Competency 1 Values/Ethics for Interprofessional Practice** – work with individuals of other professions to maintain a climate of mutual respect and shared values

- **Competency 2 Roles/responsibilities** – use the knowledge of one's own role and those of other professions to appropriately assess and address the health care needs of patients and to promote and advance the health of populations

- **Competency 3 Interprofessional communication** – communicate with patients, families, communities, and professionals in health and other fields in a responsive and responsible manner that supports a team approach to the promotion and maintenance of health and prevention and treatment of disease.

- **Competency 4 Teams and Teamwork** – apply relationship-building values and the principles of team dynamics to perform effectively in different team roles to plan, deliver, and evaluate patient/population-centred care and population health programs and policies that are safe, timely, efficient, effective, and equitable.

While many schools and colleges of optometry incorporate elements of IPE and IPC throughout their curriculum, the challenge of true integration with other health professions is daunting. Class scheduling and coordination is difficult within a program. Adding learning objectives and assessments with health professions that may have a different expected outcome, increases the complexity of integration exponentially. Limited resources, lack of full administrative support, and the sheer enormity of the task are often cited as limitations to scalability. But we can and must persevere!

Some of the most authentic experiences surrounding IPE/IPC have been demonstrated by student run clinics. Students from various health professions coming to serve those most in need with an open mind about each other's role and ability to make a positive impact. As a student at Berkeley, the "Suitcase Clinic" was just taking shape as physicians, optometrists, chiropractors, came together to help the homeless. The Suitcase Clinic has evolved into a robust campus-community collaboration group still fulfilling its mission "to promote the health and overall wellbeing of underserved individuals through service provision, cooperative learning, and collective action among community and professional volunteers, students, and participants."[7] Similar like-minded groups across Canada and the US provide the care and experience. Why not us?

Community Health Centers in the US are also a prime example of interprofessional collaborative practice where eye and vision care services are in high demand. Located in underserved communities, CHCs provide one stop access for a multitude of health care needs in close coordination, and often with a single electronic health record. Particularly for patients with chronic disease such as diabetes, it is easier to provide integration of care across the physician, optometrist, and pharmacist to care for the patient. The level and complexity of care provides the ideal training ground for optometry interns to develop the skills and confidence for primary care. Is there an opportunity for closer collaboration between optometry, ophthalmology, and medicine in community health centers in Canada in spite of dissimilar funding models?

To my knowledge, the most ambitious model for interprofessional collaborative practice is at Ketchum Health. Spearheaded by Pres. Alexander at Marshall B. Ketchum University, the backbone University Eye Center is co-located with future space allocated for medicine and pharmacy. Ophthalmology already provides in-office procedures and training with optometry students. Students from optometry, physician assistant (PA), and pharmacy will see their own patients in the same location while also being afforded an opportunity to cross-over and learn first-hand about their colleagues' roles. Is the time right in the Waterloo Wellington area to explore interest and opportunity to develop our own model to address the eye, vision, and health care needs of our community?

The Canadian Association of Optometrists brings focus and attention to the importance of eye health as a public health imperative. Similarly, the National Academies of Science, Engineering and Medicine in the United States published a call to action in a report entitled "Making Eye Health a Population Health Imperative: Vision for Tomorrow."[8] I am respectful and appreciative of the Canadian approach to health care, and I look forward to listening, learning, and working to help promote improved health outcomes for Canadians. It's good to be home. •

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Acknowledgment: Thanks to Dr. Lisa Christian for guidance and background on the current state of IPE/IPC at the School of Optometry and Vision Science.

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Stanley Woo, D.O., M.Sc., M.B.A., F.A.A.O.
Directeur
Éditorial — collaboration spéciale

C'est pour moi un grand honneur et un privilège d'être le directeur de l'École d'optométrie et des sciences de la vision de l'Université de Waterloo. Ayant grandi à Waterloo, j'ai beaucoup de bons souvenirs d'enfance où j'ai fréquenté l'école, le corps professoral, le personnel et les étudiants. J'ai eu l'impression de rentrer chez moi après avoir passé 27 ans aux États-Unis. L'École continue d'être un endroit fascinant où l'on trouve des gens merveilleux, des soins exceptionnels aux patients, une éducation de premier ordre et des recherches de calibre mondial.

Plus récemment, j'ai occupé le poste de doyen du Southern California College of Optometry (SCCO), alors qu'il se métamorphosait d'un collège indépendant, privé et sans but lucratif en une université des professions de la santé. Sous la direction visionnaire du président Kevin L. Alexander et du Conseil d'administration, le SCCO est devenu l'Université Marshall B. Ketchum avec l'ajout d'une école d'études pour les adjoints au médecin et d'une faculté de pharmacie. L'engagement et la détermination à créer un établissement où l'optométrie fait partie intégrante des soins de santé primaires étaient tout simplement stupéfiants et comprenaient l'ajout du Ketchum Health comme incubateur pour explorer des modèles de pratique en collaboration.

L'optométrie est en première ligne des soins oculovisuels, et elle est une partenaire à part entière dans les équipes interprofessionnelles. Les équipes interprofessionnelles sont des groupes de professionnels de la santé qui travaillent en collaboration pour améliorer les soins centrés sur les patients. Ces équipes ont été mises sur pied par le ministère de la Santé et des Soins de longue durée de l'Ontario afin de mieux répondre aux besoins de notre population vieillissante, en améliorant l'intégration des services et la coordination des différentes professions de la santé. Grâce à la formation interprofessionnelle et à la collaboration interprofessionnelle (FIP/CIP), l'École d'optométrie et des sciences de la vision offre aux étudiants des occasions d'en apprendre davantage sur l'expertise et les valeurs d'autres fournisseurs de soins de santé tout se sensibilisant davantage au rôle de l'optométrie dans les soins interprofessionnels pour mieux le comprendre.

Au campus des sciences de la santé du quartier de l'innovation du centre-ville de Kitchener, nous avons mis en place les bases nécessaires pour développer davantage et promouvoir l'éducation interprofessionnelle et la pratique en collaboration. Notre propre clinique d'optométrie des sciences de la santé[1], le campus de Waterloo de la Michael G. DeGroote School of Medicine[2], le Centre for Family Medicine[3] et l'UW School of Pharmacy[4] sont tous situés à proximité.

J'ai été impressionné par le niveau d'activité en FIP/CIP à l'Université de Waterloo. Les étudiants de différentes professions de la santé ont de nombreuses possibilités d'apprendre les uns des autres, de socialiser ensemble, d'échanger sur certains cas et, au bout du compte, d'améliorer la qualité des soins et les résultats pour les patients.

Voici les points saillants des activités de FIP/CIP :

- Exposé interprofessionnel annuel : Exposé parrainé par Interprofessional Education Collaborative (IPEC) de Waterloo Wellington. Les cas qui ont des ressources multimédias sont examinés et présentés par des équipes qui comptent des formateurs dans les domaines des soins infirmiers, de la pharmacie, de l'optométrie, des soins d'urgences, de la police, des incendies, du travail social, de l'ergothérapie. Chaque profession offre une perspective de son approche tout en partageant ses idées et ses réflexions sur d'autres professions.

- Journée de l'œil : Le corps professoral en optométrie, les ophtalmologistes locaux et les étudiants en optométrie offrent un atelier sur les compétences aux médecins résidents en rotation au Centre de médecine familiale. Les compétences enseignées comprennent l'ophtalmoscopie, l'utilisation du Tonopen et la biomicroscopie à lampe à fente, tout en mettant en évidence la collaboration entre l'optométrie et l'ophtalmologie.

- Journée de la formation interprofessionnelle : Journée organisée par le SouthWestern Ontario Academic Health Network. Des étudiants de première année en médecine, en dentisterie, en pharmacie, en soins infirmiers, en optométrie et en travail social participent à des discussions animées sur des études de cas et écoutent les discours-programmes d'un groupe de patients/fournisseurs de soins.

- Semaine de la vision et du vieillissement : Semaine de collaboration entre quatre étudiants en médecine de deuxième année et quatre étudiants en optométrie de quatrième année. Semaine organisée par le SouthWestern Ontario Academic Health Network. Des étudiants de première année en médecine, en dentisterie, en pharmacie, en soins infirmiers, en optométrie et en travail social participent à des discussions animées sur des études de cas et assistent aux discours-programmes d'un groupe de patients/fournisseurs de soins.

Le Consortium pancanadien pour l'interprofessionnalisme en santé a élaboré en 2010 un cadre de compétences pour aider à orienter l'élaboration d'un programme d'études et l'évaluation des résultats.[5] Mon expérience personnelle a été éclairée par le travail des membres des écoles et collèges d'optométrie des États-Unis avec l'Interprofessional Education Collaborative (IPEC)[6] et l'institut de développement du corps professoral. Les quatre compétences de base de l'IPEC sont les suivantes :

- **Compétence 1 : Valeurs/éthique pour la pratique interprofessionnelle** — travailler avec des personnes d'autres professions pour maintenir un climat de respect mutuel et de valeurs communes

- **Compétence 2 : Rôles et responsabilités** — utiliser la connaissance de son propre rôle et de celui d'autres professions pour évaluer adéquatement les besoins en soins de santé des patients et y répondre, et pour promouvoir et faire progresser la santé des populations.

- **Compétence 3 : Communication interprofessionnelle** — communiquer avec les patients, les familles, les collectivités et les professionnels de la santé et d'autres domaines d'une manière réceptive et responsable qui appuie une approche d'équipe pour la promotion et le maintien de la santé, la prévention et le traitement des maladies.

- **Compétence 4 : Équipes et esprit d'équipe** — appliquer les valeurs propres à l'établissement de relations et les principes de la dynamique d'équipe pour s'acquitter efficacement des différents rôles de l'équipe afin de planifier, d'offrir et d'évaluer des programmes et des politiques de santé de la population, axés sur les patients et la population, qui sont sécuritaires, opportuns, efficients, efficaces et équitables.

Bien que bon nombre d'écoles et de collèges d'optométrie intègrent des éléments de la FIP et de la CIP dans leur programme d'études, le défi d'une véritable intégration avec d'autres professions de la santé est intimidant. La planification et la coordination des classes sont difficiles au sein d'un programme. L'ajout d'objectifs d'apprentissage et d'évaluations avec les professions de la santé qui peuvent avoir un résultat attendu différent accroît de façon exponentielle la complexité de l'intégration. Les ressources limitées, le manque de soutien administratif complet et l'énormité de la tâche sont souvent cités comme des limites à l'extensibilité. Mais nous pouvons et devons persévérer!

Certaines des expériences les plus authentiques entourant la FIP/CIP ont été démontrées par des cliniques dirigées par des étudiants. Des étudiants de diverses professions de la santé viennent au service de ceux qui en ont le plus besoin en faisant preuve d'ouverture d'esprit au sujet du rôle de l'autre et de sa capacité à avoir un effet positif. En tant qu'étudiant à Berkeley, la « clinique Suitcase » venait tout juste de prendre forme, alors que les médecins, les optométristes et les chiropraticiens se sont réunis pour aider les sans-abri. La clinique Suitcase est devenue un solide groupe de collaboration communautaire sur le campus qui remplit toujours sa mission qui consiste à « promouvoir la santé et le bien-être général des personnes mal desservies grâce à la prestation de services, à l'apprentissage coopératif et à une action collective des bénévoles communautaires et professionnels, des étudiants et des participants. »[7] Des groupes d'optique commune semblables au Canada et aux États-Unis fournissent les soins et l'expérience. Pourquoi pas nous?

Les centres de santé communautaires aux États-Unis sont aussi un excellent exemple de pratique de collaboration interprofessionnelle où les services de soins oculovisuels sont en forte demande. Situés dans des collectivités mal desservies, les centres de santé communautaires offrent un accès unique pour une multitude de besoins en soins de santé, en étroite coordination et souvent avec un seul dossier de santé électronique. Particulièrement dans les cas de patients atteints de maladies chroniques comme le diabète, il est plus facile d'intégrer les soins du médecin, de l'optométriste et du pharmacien pour soigner le patient. Le niveau et la complexité des soins constituent le terrain de formation idéal pour les stagiaires en optométrie afin d'acquérir les compétences et la confiance en soins primaires. Existe-t-il une possibilité de collaboration plus étroite entre l'optométrie, l'ophtalmologie et la médecine dans les centres de santé communautaires au Canada, malgré des modèles de financement différents?

À ma connaissance, le modèle de collaboration interprofessionnelle le plus ambitieux est celui de Ketchum Health. Piloté par le président Alexander à l'Université Marshall B. Ketchum, le centre oculaire universitaire de base est situé au même endroit que l'espace futur réservé à la médecine et à la pharmacie. L'ophtalmologie offre déjà des procédures et de la formation en cabinet aux étudiants en optométrie. Les étudiants en optométrie, en formation d'adjoint au médecin et en pharmacie verront leurs propres patients au même endroit, tout en ayant la possibilité de faire un survol et d'apprendre directement les rôles de leurs collègues. Le moment est-il venu, dans la région de Waterloo Wellington, d'explorer l'intérêt et la possibilité d'élaborer notre propre modèle pour répondre aux besoins de notre collectivité en matière de soins oculovisuels et de santé?

L'Association canadienne des optométristes attire l'attention sur l'importance de la santé oculovisuelle comme impératif de santé publique. De même, l'organisme américain National Academies of Science, Engineering and Medicine a publié un appel à l'action dans un rapport intitulé « Making Eye Health a Population Health Imperative: Vision for Tomorrow. »[8] Je respecte et j'apprécie l'approche canadienne en matière de soins de santé, et j'ai hâte d'écouter, d'apprendre et de travailler à promouvoir l'amélioration des résultats pour la santé des Canadiens. Je suis heureux d'être rentré chez moi. ●

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Role of Primary Care Optometrists in the Assessment and Management of Patients with Traumatic Brain Injuries in Canada

Zoe Lacroix, O.D.
Clinical Resident,
Paediatrics and
Vision Therapy
School of Optometry
and Vision Science,
University of Waterloo

Susan J. Leat,
PhD, FCOptom, F.A.A.O.
Professor,
School of Optometry
and Vision Science,
University of Waterloo

Lisa W. Christian, O.D.,
F.C.O.V.D., F.A.A.O.
Clinical Associate Professor
School of Optometry
and Vision Science,
University of Waterloo
Waterloo

Introduction

Traumatic brain injury (TBI) results from a strong blow or jolt to the head that disrupts the normal function of the brain.[1] The severity of a TBI can range from mild to severe, depending on the patient's mental status, consciousness level and amnesia following the injury. The annual incidence of TBI in North America and Europe is conservatively estimated to be approximately 600/100,000.[2,3] This translates to at least 200,000 TBI cases in Canada every year. According to the Centers for Disease Control and Prevention, and the Canadian Institute for Health Information, the leading cause of TBIs that result in hospital admission is falls (35%-45%), followed by motor vehicle accidents (17%-36%), collision-related events (struck by or against) (10-17%) and assaults (9-10%).[4,5] Head injuries are more common in the 0- to 19-year age group, followed by those who are aged 60+. Males are more highly represented in every age group than females. However, it should be noted that the demographics of patients who present in an optometrist's office may differ from those based on hospital admissions.

TBIs are classified by the duration of loss of consciousness and post-traumatic amnesia, along with the results of brain imaging (Table 1).[6,7] Not all of these signs need to be present. Menon et al. stated that TBI can be diagnosed when there is alteration in brain function defined by any one of the following signs: a period of loss or decreased consciousness, any loss of memory for events immediately before or after the injury, neurologic deficits (weakness, loss of balance, change in vision, dyspraxia paresis/paralysis, sensory loss, aphasia, etc.), and any alteration in mental state at the time of the injury (confusion, disorientation, slowed thinking, etc.).[8]

Common phenomena following a TBI include decreased attention, concentration and processing speed, memory problems, confusion, irritability, depression and anxiety. Physical consequences can include headaches, fatigue, dizziness and nausea, balance difficulties, visual disturbance and sleep disruption.[1] In cases of moderate to severe TBI, patients may also experience decreased executive function, increased confusion, depression, anxiety, lack of impulse control, chronic pain and severe physical consequences.[6] Visual symptoms are observed in 75% of TBI cases.[9] These symptoms can be caused by decreased visual function, disorders of the binocular vision system, changes in ocular health and higher-order processing disorders, which are discussed further below. Due to the broad spectrum of visual symptoms that may occur following TBIs, it is important for the primary care optometrist to be familiar with the testing and management of patients with a history of traumatic brain injury.

Table 1: *TBI Classification System* [6,7]

Characteristic	Mild TBI	Moderate TBI	Severe TBI
Loss of consciousness (LOC)	0 to 30 mins	0.5 to 24 h	>24 h
Post-traumatic amnesia (PTA)	0-1 days	1-7 days	>7 days
Brain-imaging results	Normal	Abnormal	Abnormal

EVALUATION

A thorough ocular-visual assessment (OVA) should be performed for all patients following a TBI. Testing includes a detailed case history, refraction, routine binocular vision and accommodation assessment, automated visual fields and ocular health assessment with dilated fundus evaluation. Additional in-depth testing of some systems should be included in the OVA for patients with a suspected or diagnosed TBI. This includes complementary assessments of the accommodative, vergence and oculomotor systems, and may include visual information-processing testing and visual-midline shift assessment.

The TBI population is also susceptible to cognitive and/or memory impairments, and special consideration should be given when considering the speed and duration of testing. Patients with TBI frequently require more time to process questions and commands. Therefore, objective measurements are preferred, as they will often provide more reliable results.[10] The results of clinical testing should include any reported dizziness, headaches, nausea, or photophobia. If necessary, it may be beneficial to separate the vision examination into two or more appointments.

Case history

A thorough review of visual symptoms should be conducted, which can be facilitated by a symptom checklist completed by the patient prior to the appointment.[11] Case history should include details of the TBI incident and associated injuries. It is useful to review the patient's current and previous rehabilitation services and the progress of their therapy (occupational therapy, physiotherapy, etc.). Patient goals and needs should also be assessed, including their occupational and vocational visual demands, computer use, driving, mobility and reading. Optometrists should remember to record previous ocular conditions and general health (pre- and post-TBI), to differentiate between new and pre-existing conditions.

Visual acuity and refraction

Visual acuity itself is less often affected by TBI, and therefore traditional methods (i.e. Snellen) can be used to assess visual acuity in TBI patients. If a patient has cognitive or communication impairments, modified charts such as a Tumbling E or Broken Wheel test may provide more valid results.[11]

When the optometrist performs a refraction, objective measurements such as retinoscopy should be considered for all patients since it may be difficult to elicit reliable subjective responses. Automated refractors can also be considered for photophobic patients. Although TBIs may not directly change a patient's refractive error, this population may become more sensitive to small prescription changes or uncorrected refractive errors. Special consideration should be given to latent or uncorrected hyperopic patients, who may become symptomatic following a TBI.[12] Progressive addition lenses are not recommended due to peripheral distortions.

Ocular health

A thorough slit lamp examination is performed to assess the ocular health of TBI patients, including a dilated fundus evaluation. Ocular health disorders following TBI can affect the anterior or posterior segments and may include angle recession, dry eye, intraocular hemorrhage or embolisms and papilledema.[13-17] An in-depth assessment of the cranial nerves, pupils and optic nerves should also be performed. Appropriate treatment should be made for the management of these conditions or referral when indicated, such as to the family physician, ophthalmologist, neuro-ophthalmologist, neurologist, etc.

Visual field

Visual field defects may occur through trauma to the optic nerve, chiasm, optic radiations, or occipital cortex.[15-17] Subtle visual field defects may not be detected by confrontational visual field.[18] Automated perimetry is better suited for detecting mild neurological defects and for monitoring changes over time.[18] Screening for visual neglect should also be considered for TBI patients.[19-21] Tests for spatial inattention (neglect) include line bisection and the clock drawing test.[22]

Once appropriate investigation into the visual defect has been completed, treatment therapies are typically aimed at increasing the awareness of the affected field and the development of compensatory techniques. This can be achieved via field-enhancing prisms such as sector prisms, or Peli prisms.[23,24] These prisms are aimed at bringing the image of the affected field into view to provide the patient with information about their periphery. Compensatory functional and rehabilitative techniques can also be taught to patients, such as field scanning, and visuomotor, behavioural and reading techniques.[24,25]

Visual midline shift

Visual midline shift syndrome (VMSS) has been defined as a sense of shifted egocenter and has been reported after brain injuries.[26] It is often associated with, and indeed, may result from, neglect and/or hemianopia, although the exact association has not been documented. These alterations in the perceived midline can create changes in balance and posture. Healthcare professionals who typically address gait and balance include physiotherapists and occupational therapists.[26]

Standardized assessment procedures have not been developed for visual midline shift testing. Current techniques include the subjective alignment of a wand at the midline, eye-hand coordination tests, observation of gait, as well as emerging devices to more accurately quantify the deviation and egocenter.[26] Padula and Argyris stated that a horizontal shift in midline may result in a lateral lean away from the affected visual space, and a possible drift left or right when walking. A vertical shift may result in tilting the body forward or backward (posterior/anterior).[27]

Although further research in this field is needed, practitioners have reported success with the use of compensatory yoked prisms.[26] For assessment, prism lenses are initially placed with the base in the direction opposite the perceived shift in midline, aiming to realign the patient's egocenter. Testing is then repeated with different lenses in place. These trials are usually completed with yoked prisms under 10-12 prism diopters. Spatial localization therapies have also been used to enhance eye-hand coordination. A second approach is prism adaptation, in which localization training is undertaken with prisms in place, with the base contralateral to the direction of the shift. Typically, a higher power of prism is used (17 prism diopters). When the prisms are removed, pointing becomes more central, which can last up to 3.5 years.[28]

Accommodation

Accommodative dysfunctions are present in approximately 40% of TBI patients,[29,30] and include accommodative insufficiency, accommodative infacility, or accommodative spasms (which may induce pseudo-myopia).[31] Accommodative testing should include the assessment of accommodative amplitudes (push-up to blur, or pull away to clear), accommodative accuracy (Monocular Estimation Method, cross cylinder evaluation, or Nott's modified dynamic retinoscopy) and accommodative facility (monocular and binocular).[10]

Management of accommodative disorders may include reading glasses with increased plus at near,[10] or vision rehabilitation exercises.[10,32,33] In non-presbyopic patients, vision exercises are usually recommended as the initial treatment and may include accommodative rock using lenses or different distances, as well as accommodative push-up techniques. There is some evidence that 87-100% of patients with accommodative dysfunctions show improvements with vision therapy.[33]

Binocular vision

Vergence dysfunctions are one of the most common disorders following TBI, and are seen in approximately 50% of patients.[9,29,34] Common disorders include convergence insufficiency (36%), binocular instability (restricted vergence ranges) (10%), basic esophoria (18% of patients with cerebrovascular accidents) and strabismus (e.g., intermittent exotropia, cranial nerve palsy) (7-25%).[9,29,34]

Binocular vision testing should include routine and additional testing, including ocular alignment at distance and near (cover test, Maddox rod, phoria, associated phoria), motor fusion (vergence ranges, near point of convergence, vergence facility with 3BI/12BO prism jumps), sensory fusion (stereoscopy and fusion) and ocular motilities.[12]

Management of vergence disorders may include lenses, correcting prism, or vision therapy exercises.[12,33,35] Vision therapy is usually recommended as the initial treatment for convergence insufficiency, while plus lenses should initially be considered for convergence excess. In-office binocular vision training has been used to successfully treat > 75% of TBI patients with convergence insufficiency.[33,35] These therapies include Brock string, pencil push-ups, prism jumps, or instruments such as the Aperture Rule, cheiroscopes, vectograms and tranaglyphs, often in combination.

Oculomotor

Fixation, pursuits and saccades are affected in approximately 20% of TBI patients.[36] Test procedures that involve oculomotor function include the Developmental Eye Movement Test, King Devick Test, Visagraph/ReadAlyzer goggles with infra-red sensors and the NSUCO (Northeastern State University College of Optometry) and SCCO (Southern California College of Optometry) oculomotor tests.[12]

Treatment is aimed at training each of these individual skills. There is some evidence that oculomotor therapies are successful in improving these skills, especially with reading.[12,33,37] Although training techniques for oculomotor skills have not been extensively researched, therapies can include letter-tracking workbooks, oculomotor pursuit exercises, Brock string fixations, flashlight tag and computerized programs (i.e., Home Therapy System [HTS]) or other computer-aided vision therapy software).

Photophobia

Following a TBI, patients commonly report photophobia and increased sensitivity to glare.[38] Despite its prevalence, photophobia remains poorly understood and is difficult to assess and treat. Ongoing research in this field is performed to better understand the underlying mechanisms. Various theories have attributed photophobia to migraines following TBI, damage to the pain-sensitive intracranial structure and deficits in dark adaptation.[38-40]

For TBI patients, the case history should include questions about increased sensitivity to glare, sunlight, computers and screens.[41] Careful pupil testing should be performed, although this will often yield normal results. Dry eye or headaches should also be investigated, as these conditions may exacerbate photophobia symptoms.[38] All underlying disease should be appropriately treated.

Although no major studies have been conducted on the management of photophobia symptoms, current treatment options include tinted lenses, overlays, and polarized, photochromic or fit-over sunglasses.[41] These options are mostly selected subjectively, but often provide relief to patients and improve their visual comfort. However, there is some evidence that no tint, lighter tints or decreasing the tint over time encourages a decrease in photosensitivity with time.[42]

MULTIDISCIPLINARY APPROACH

It is not uncommon for TBI patients to have comorbid health conditions. A multidisciplinary approach is always recommended when managing these patients. Interprofessional collaboration with other health care providers allows improved patient care through regular progress reports and communications. In addition to optometrists and ophthalmologists, other specialists who are often involved in the care of TBI patients include medical doctors, neurologists, physiotherapists, occupational therapists, audiologists, vestibular therapists, physical therapists and chiropractors. It is recommended that optometrists develop a good relationship with other providers to ensure optimal patient care. Allied healthcare providers should be provided with a report detailing the oculo-visual findings and recommendations for mutual patients.

CONCLUSION

As discussed, visual symptoms are very common following TBI. These patients benefit from a thorough optometric evaluation to identify and manage any underlying vision condition. Treatments may include tinted lenses and overlays, corrective and prismatic lenses, and vision therapy and rehabilitation. Addressing the visual needs of patients with TBI can reduce their symptoms, improve their quality of life and help them return to work and daily living. ●

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Rôle des optométristes de soins primaires dans l'évaluation et la prise en charge des patients ayant subi un traumatisme cérébral au Canada

Zoe Lacroix, D.O.
Résidente clinique,
pédiatrie et thérapie visuelle
École d'optométrie et
de sciences de la vision,
Université de Waterloo

Susan J. Leat,
PhD, FCOptom, F.A.A.O.
Professeure
École d'optométrie et
de sciences de la vision,
Université de Waterloo

Lisa W. Christian, D.O.,
F.C.O.V.D., F.A.A.O.
Professeure agrégée
de clinique
École d'optométrie et
de sciences de la vision,
Université de Waterloo

Introduction

Les traumatismes cérébraux (TCC) résultent d'un choc violent à la tête qui perturbe le fonctionnement normal du cerveau.[1] On catégorise le TCC en trois degrés de gravité qui vont de léger à grave, selon l'état mental du patient, son niveau de conscience et l'amnésie provoquée par la lésion. Selon une estimation prudente, l'incidence annuelle du TCC en Amérique du Nord et en Europe est d'environ 600/100 000.[2,3] Cela représente au moins 200 000 cas de TCC au Canada chaque année. Selon les Centers for Disease Control and Prevention et l'Institut canadien d'information sur la santé, les principales causes de TCC entraînant une hospitalisation sont les chutes (35 - 45 %), suivies des accidents de la route (17 - 36 %), des événements liés aux collisions (se heurter sur ou être heurté par) (10 -17 %) et des agressions (9 -10 %).[4,5] Les blessures à la tête sont plus courantes chez les enfants et les jeunes (0-19 ans), suivis par les personnes âgées (60 ans et plus). Ils sont aussi plus fréquents chez les hommes que chez les femmes, et ce, dans chaque groupe d'âge. Cependant, il convient de noter que la démographie des patients qui se présentent dans un cabinet d'optométriste peut différer de celle qui est basée sur les admissions à l'hôpital.

Les traumatismes cérébraux sont classés en fonction de la durée de la perte de conscience et de l'amnésie post-traumatique, ainsi que des résultats de l'imagerie cérébrale (Tableau 1).[6,7] Tous ces signes ne sont pas nécessairement présents. Selon Menon et coll., un diagnostic de TCC peut être établi lorsqu'il y a altération de la fonction cérébrale définie par l'un des signes suivants : une période d'altération du niveau de conscience ou de perte de conscience, une perte de mémoire pour des événements survenus immédiatement avant ou après la blessure, des déficits neurologiques (faiblesse, perte d'équilibre, changement de la vision, parésie, paralysie ou dyspraxie, perte sensorielle, aphasie, etc.), et toute altération de l'état mental au moment de la blessure (confusion, désorientation, ralentissement de la pensée, etc.).[8]

Les phénomènes fréquents à la suite d'un TCC comprennent une diminution de l'attention, de la concentration et de la vitesse de traitement de l'information, des problèmes de mémoire, de la confusion, de l'irritabilité, de la dépression et de l'anxiété. Les conséquences physiques peuvent inclure des céphalées, de la fatigue, des étourdissements et des nausées, des troubles de l'équilibre, des troubles visuels et une perturbation du sommeil[1]. En cas de TCC modéré à grave, les patients peuvent également éprouver une baisse de la fonction exécutive, une confusion accrue, des symptômes de dépression, de l'anxiété, un manque de contrôle des impulsions, de la douleur chronique et des répercussions physiques graves.[6] Des symptômes visuels sont observés dans 75 % des cas de TCC.[9] Ces symptômes peuvent être causés par une diminution de la fonction visuelle, des troubles du système de vision binoculaire, des changements dans la santé oculaire et des troubles du traitement plus complexes, qui seront présentés plus loin. En raison du large éventail de symptômes visuels qui peuvent se manifester après un traumatisme cérébral, il est important que l'optométriste de soins primaires soit familier avec les tests et la prise en charge des patients ayant des antécédents de lésion cérébrale traumatique.

Tableau 1 : *Système de classification du TC* [6,7]

Caractéristiques	TC léger	TC modéré	TC grave
Perte de conscience	0 à 30 minutes	0,5 à 24 heures	>24 heures
Amnésie post-traumatique (APT)	0-1 jour	1-7 jours	>7 jours
Résultats de l'imagerie du cerveau	Normaux	Anormaux	Anormaux

ÉVALUATION

À la suite d'un TCC, une évaluation oculovisuelle complète doit être réalisée pour tous les patients. Les examens comprennent un historique détaillé des antécédents, la réfraction, la vision binoculaire et l'évaluation de l'accommodation courantes, des champs visuels automatisés et une évaluation de la santé oculaire avec un examen du fond d'œil sous mydriatique. L'évaluation oculovisuelle doit comprendre des tests supplémentaires approfondis de certains systèmes pour les patients avec un TCC suspecté ou diagnostiqué. Cela comprend des évaluations complémentaires de l'accommodation, de la vergence et du système oculomoteur, et peut comprendre des tests visuels de traitement de l'information et une évaluation du déplacement visuel de la ligne médiane.

Les personnes ayant subi un TCC sont également plus susceptibles de souffrir de troubles cognitifs et/ou de la mémoire, et il importe d'accorder une attention particulière à la vitesse à laquelle les tests sont administrés et à leur durée. Les patients qui ont subi un TCC ont souvent besoin de plus de temps pour traiter les questions et les indications. Par conséquent, les mesures objectives sont préférables, car elles fournissent souvent des résultats plus fiables.[10] Les résultats des tests cliniques doivent comprendre tout problème d'étourdissements, de maux de tête, de nausées ou de photophobie qui aurait pu être signalé par le patient. Au besoin, il peut être préférable d'effectuer l'examen oculovisuel en deux étapes ou plus, réparties sur autant de rendez-vous.

Antécédents médicaux

Un examen approfondi des symptômes visuels devrait être effectué, ce qui peut être facilité en demandant au patient de remplir une liste de vérification des symptômes avant la consultation.[11] Les antécédents médicaux devraient comprendre des renseignements sur l'incident responsable du TCC et les blessures associées. Il est utile d'examiner les services de réadaptation actuels et antérieurs du patient et les progrès de leur thérapie (ergothérapie, physiothérapie, etc.). Il faut également évaluer les objectifs et les besoins des patients, y compris les exigences visuelles liées à leur profession, à l'utilisation de l'ordinateur, à la conduite automobile, à la mobilité et à la lecture. Les optométristes doivent se rappeler d'inscrire au dossier les affections oculaires et l'état de santé général antérieurs (avant et après le TCC), afin d'établir une distinction entre les affections nouvelles et préexistantes.

Acuité visuelle et réfraction

Comme l'acuité visuelle elle-même est moins souvent affectée par le TCC, les méthodes habituelles (à savoir, le Snellen) peuvent être utilisées pour évaluer l'acuité visuelle chez les patients ayant subi un TCC. Si un patient est atteint de troubles cognitifs ou de la communication, l'utilisation d'un tableau optométrique Tumbling E ou d'un test Broken Wheel peuvent fournir des résultats plus fiables.[11]

Lorsque l'optométriste effectue un examen de la réfraction, il faut envisager de recourir à des méthodes de mesure objectives comme la rétinoscopie pour tous les patients, car il peut être difficile d'obtenir des réponses subjectives fiables. Il est également possible d'utiliser un réfracteur automatique pour les patients photophobes. Bien que les TCC ne modifient pas directement l'erreur de réfraction d'un patient, cette population peut devenir plus sensible aux petites modifications de prescription ou aux erreurs de réfraction non corrigées. Il faut accorder une attention particulière aux patients souffrant d'hypermétropie latente ou non corrigée, qui peuvent devenir symptomatiques à la suite d'un TCC.[12] Les verres à foyer progressif ne sont pas recommandés en raison de distorsions périphériques.

Santé oculaire

Un examen approfondi à la lampe à fente est effectué pour évaluer la santé oculaire des patients ayant subi un TCC, y compris un examen du fond d'œil sous mydriatique. Les troubles oculaires consécutifs à un TCC peuvent toucher les segments antérieur et postérieur et peuvent comprendre une récession de l'angle, une sécheresse oculaire, une hémorragie intraoculaire ou des embolies et un œdème papillaire.[13-17] Une évaluation approfondie des nerfs crâniens, des pupilles et des nerfs optiques doit également être effectuée. La prise en charge de ces affections exige un traitement approprié ou, le cas échéant, l'aiguillage du patient vers un médecin de famille, un ophtalmologiste, un neuro-ophtalmologiste, un neurologue, etc.

Champs visuels

Les altérations du champ visuel peuvent survenir à la suite d'un traumatisme du nerf optique, du chiasma, des voies optiques ou du cortex occipital.[15-17] Les altérations légères du champ visuel peuvent ne pas être détectées par un examen du champ visuel par confrontation.[18] La périmétrie automatisée est mieux adaptée à la détection de légers troubles neurologiques et au suivi des changements au fil du temps.[18] Le dépistage de la négligence visuelle devrait également être envisagé chez les patients ayant subi un TCC.[19-21] Les tests d'inattention spatiale (négligence) comprennent le test de bissection de la ligne et le test du dessin de l'horloge.[22]

À la suite d'une évaluation adéquate de l'altération du champ visuel, les méthodes de traitement visent généralement à accroître la conscience du champ affecté et à développer des techniques de compensation. Ceci peut être réalisé en utilisant des prismes qui améliorent le champ tel que des prismes sectoriels ou des prismes de Peli.[23,24] Ces prismes visent à mettre en évidence l'image du champ affecté afin de fournir au patient des renseignements sur sa périphérie. Des techniques de compensation fonctionnelle et de réadaptation comme le balayage de champ et les techniques oculomotrices, comportementales et de lecture peuvent également être enseignées aux patients.[24,25]

Déplacement visuel de la ligne médiane

Le syndrome du déplacement visuel de la ligne médiane (DVLM) a été défini comme une sensation de déplacement de l'égocentre et a été rapporté après des lésions cérébrales.[26] Il est souvent associé à la négligence et/ou à l'hémianopsie et peut même en résulter, bien que l'association exacte n'ait pas été documentée. Ces altérations dans la ligne médiane perçue peuvent entraîner des changements dans l'équilibre et la posture. Les professionnels de la santé qui traitent habituellement la démarche et l'équilibre comprennent les physiothérapeutes et les ergothérapeutes.[26]

Il n'y a pas de procédures d'évaluation normalisées pour le déplacement visuel de la ligne médiane. Les techniques actuelles comprennent l'alignement subjectif d'une baguette sur la ligne médiane, des essais de coordination œil-main, l'observation de la démarche, ainsi que des dispositifs émergents pour quantifier plus précisément la déviation de l'égocentre[26]. Padula et Argyris ont déclaré qu'un déplacement horizontal de la médiane a pour résultat une inclinaison latérale du côté opposé à l'espace visuel affecté, et une dérive possible vers la gauche ou la droite en marchant. Un déplacement vertical peut entraîner l'inclinaison du corps vers l'avant ou vers l'arrière (postérieure/antérieure).[27]

Bien qu'il soit nécessaire de poursuivre les recherches, certains praticiens ont rapporté avoir utilisé des « *yoke prisms* » compensatoires avec succès.[26] Pour l'évaluation, la base des lentilles prismatiques est initialement dirigée vers le côté du déplacement perçu dans la ligne médiane pour réaligner l'égocentre du patient. L'essai est ensuite répété en utilisant d'autres lentilles. On procède généralement à ces essais avec des *yoked prisms* de moins de 10 à 12 dioptries prismatiques. Les thérapies de localisation spatiale ont également été utilisées pour améliorer la coordination œil-main. Une deuxième approche est l'adaptation prismatique, dans laquelle l'entraînement de localisation est entrepris avec des prismes dont la base est placée du côté opposé à la direction du déplacement. On utilise généralement des prismes plus puissants (17 dioptries prismatiques). Lorsque les prismes sont retirés, la fixation devient plus centrale, et l'amélioration peut durer jusqu'à 3,5 ans.[28]

Accommodation

Les troubles de l'accommodation sont présents chez environ 40 % des patients ayant subi un TCC[29,30] et comprennent une insuffisance d'accommodation, une difficulté d'accommodation ou des spasmes d'accommodation (qui peuvent induire une pseudo-myopie).[31] L'examen de l'accommodation doit comprendre l'évaluation de l'amplitude d'accommodation (par le « push-up test » ou la courbe de défocalisation), de l'exactitude accommodative (méthode d'estimation de la vision monoculaire, méthode du cylindre croisé, ou rétinoscopie dynamique modifiée de Nott) et de la facilité d'accommodation (monoculaire et binoculaire).[10]

La prise en charge des troubles de l'accommodation peut inclure des lunettes de lecture avec verres positifs[10] ou des exercices de réadaptation de la vision.[10,32,33] Chez les patients non presbytes, on recommande généralement des exercices oculaires comme traitement initial, qui peuvent comprendre des exercices d'alternance entre des lentilles ou distances différentes ainsi que des exercices de focale (*accommodative push-up*). Il y a quelques données probantes montrant que la thérapie visuelle améliore les troubles de l'accommodation chez 87-100 % des patients.[33]

Vision binoculaire

Les troubles de vergence sont l'un des troubles les plus fréquents après un TCC et sont observés chez environ 50 % des patients.[9,29,34] Les troubles courants comprennent l'insuffisance de convergence (36 %), l'instabilité binoculaire (étendue des vergences restreinte) (10 %), l'ésophorie (18 % des patients ayant subi un accident vasculaire cérébral) et le strabisme (p. ex., exotropie intermittente, paralysie du nerf crânien) (7-25 %).[9,29,34]

L'examen de la vision binoculaire doit inclure des procédures courantes et des tests supplémentaires, y compris l'alignement oculaire à distance et de près (test de l'écran, baguette de Maddox, phorie, phorie associée), la fusion motrice (étendue des vergences, point de convergence proche, flexibilité de convergence avec alternance de prisme 3BI/12BO), la fusion sensorielle (stéréoscopie et fusion) et la motilité oculaire.[12]

La prise en charge des troubles de vergence peut inclure des verres, un prisme correcteur ou des exercices de thérapie visuelle.[12,33,35] La thérapie visuelle est habituellement recommandée comme traitement initial de l'insuffisance de convergence, alors que les verres positifs devraient être pris en considération pour l'excès de convergence. L'entraînement en vision binoculaire en cabinet a été utilisé pour traiter avec succès plus de 75 % des patients ayant subi un TCC qui présentent une insuffisance de convergence.[33,35] Ces thérapies incluent les cordes de Brock, l'exercice du crayon, des alternances de prisme ou des instruments tels que le diploscope, le cheiroscope, les vectogrammes et les tranaglyphes, souvent en combinaison.

Système oculomoteur

La fixation, les poursuites et les saccades sont affectées chez environ 20 % des patients ayant subi un TCC.[36] Les procédures d'évaluation de la fonction oculomotrice incluent le *Developmental Eye Movement Test*, le *King Devick Test*, les lunettes Visagraph/ReadAlyzer avec capteurs infrarouges ainsi que les tests oculomoteurs NSUCO (Northeastern State University College of Optometry) et SCCO (Southern California College of Optometry).

Le traitement vise à exercer chacune de ces compétences individuelles. Certaines données montrent que les thérapies oculomotrices réussissent à améliorer ces compétences, en particulier en lecture.[12,33,37] Bien que les techniques servant à améliorer les capacités oculomotrices n'aient pas fait l'objet de recherches approfondies, les thérapies peuvent inclure des cahiers de suivi des lettres, des exercices de poursuite oculomotrice, la fixation d'une corde de Brock, le cache-cache lumineux et des programmes informatisés (c.-à-d., Home Therapy System [HTS] ou un autre logiciel de thérapie visuelle assistée par ordinateur).

Photophobie

Les patients rapportent fréquemment une photophobie et une sensibilité accrue à l'éblouissement à la suite d'un TCC.[38] Malgré sa prévalence, la photophobie demeure mal comprise et difficile à évaluer et à traiter. Des recherches sont en cours dans ce domaine pour mieux comprendre les mécanismes sous-jacents. Diverses théories ont attribué la photophobie aux migraines causées par le TCC, à des lésions de la structure intracrânienne sensible à la douleur et à des troubles d'adaptation à l'obscurité.[38-40]

Les antécédents médicaux des patients ayant subi un TCC doivent comprendre des questions sur l'augmentation de la sensibilité à l'éblouissement, à la lumière du soleil, aux ordinateurs et aux écrans.[41] Des tests minutieux des pupilles doivent être effectués, bien que cela donne souvent des résultats normaux. La sécheresse oculaire et les céphalées devraient faire l'objet d'un examen approfondi, car ces problèmes peuvent exacerber les symptômes de photophobie.[38] Toutes les maladies sous-jacentes doivent être traitées de manière appropriée.

Bien qu'aucune étude majeure n'ait été menée sur la prise en charge des symptômes de photophobie, les options de traitement actuelles comprennent des verres teintés, des filtres et des lunettes de soleil polarisées, photochromiques ou ajustables.[41] Ces options sont généralement choisies de façon subjective, mais soulagent souvent les patients et améliorent leur confort visuel. Cependant, certaines données montrent que l'absence de teinte, les teintes plus claires ou une diminution graduelle de la teinte favorisent une diminution de la photosensibilité au fil du temps.[42]

APPROCHE MULTIDISCIPLINAIRE

Il n'est pas rare que les patients ayant subi un TCC présentent des problèmes de santé concomitants. Une approche multidisciplinaire est toujours recommandée lors de la prise en charge de ces patients. La collaboration interprofessionnelle avec d'autres fournisseurs de soins de santé permet d'améliorer les soins aux patients grâce à des rapports d'étape et des communications réguliers. En plus des optométristes et des ophtalmologistes, les autres spécialistes qui s'occupent souvent des patients ayant subi un TCC comprennent les médecins, les neurologues, les physiothérapeutes, les ergothérapeutes, les audiologistes, les spécialistes en thérapie vestibulaires, les physiothérapeutes et les chiropraticiens. Il est recommandé que les optométristes développent une bonne relation avec les autres fournisseurs afin de garantir des soins optimaux aux patients. Lorsque d'autres professionnels de la santé partagent la prise en charge du patient, ils devraient recevoir un rapport présentant les résultats de l'examen oculovisuel et les recommandations concernant ces patients.

CONCLUSION

Comme nous venons de le voir, les symptômes visuels sont très fréquents après un TCC. Ces patients tirent avantage d'une évaluation optométrique approfondie visant à identifier et à prendre en charge tout problème de vision sous-jacent. Les traitements peuvent comprendre des lentilles teintées et des filtres, des verres correcteurs et prismatiques, ainsi que la thérapie et la rééducation visuelle. En répondant aux besoins visuels des patients ayant subi un TCC, nous pouvons réduire leurs symptômes, améliorer leur qualité de vie et les aider à retourner au travail et à la vie quotidienne. ●

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Pituitary Tumor Associated with Situs Inversus of the Optic Nerve Head

T. David Williams, OD, MS, PhD
Professor Emeritus
School of Optometry
University of Waterloo

Abstract

This report present further developments in a patient with an unusual vascular pattern on both optic nerve heads: the trunks of the central retinal vessels appear on the temporal side of the nerve head (situs inversus of the blood vessels of the nerve head). This vascular pattern was also present (to only slightly varying degrees) in all six of his children (two girls and four boys). Twenty-one years after the first presentation of this patient, he developed a non-secretory pituitary tumor. This case suggests that congenital nerve head anomalies may be markers for potential intracranial tumors later in life.

INTRODUCTION

Embryonic development of the pituitary gland and optic nerve head proceed within the same time-frame as development of the central nervous system (approximately 40 days after conception). The optic vesicle and stalk are outgrowths of the diencephalon, as is the neural portion of the pituitary gland (neurohypophysis). The anterior portion of the pituitary gland (adenohypophysis) and the anterior segment of the eye are derived from the surface ectoderm and neural crest. Thus, disturbances in growth occurring at around the 40-day stage may affect the development of both the optic nerve and the pituitary gland.

In an ophthalmic context, the term situs inversus has been used to describe tilted nerve heads, a temporal appearance of the central retinal vessel trunks, or both. This condition can also be described in terms of the presence or absence of a crescent of visible sclera, usually on the side opposite the most elevated portion of the nerve head. This group of findings raises questions about the processes that are underway while these structures are being formed. Apple and co-workers[1] described situs inversus of the retinal vessels as an element in the tilted disk syndrome; however, in the present cases, there were neither observable tilts to the nerve heads nor crescents of hypopigmentation. Thus, situs inversus of the retinal vessels may occur independently of the usually inferiorly located colobomas described by Apple, and may not be caused by disturbances in the closure of the fetal fissure. Situs inversus of the central retinal vessels is also seen in Williams (elfin-face) syndrome[2] and Ehlers-Danlos syndrome.[3]

In some cases, tilted nerve heads by themselves are associated with visual field loss, and this is often of a bitemporal nature,[4] without respect for the vertical midline. Considering that the axons from the nasal retina develop long before those from the temporal retina, the presence of bitemporal field losses argues for a disturbance >>>that occurs<<< comparatively early in the embryonic development of the visual system.

Fig. 1. Fundus photos of the patient's family. Top (inside the box): *photos on the left show the patient; photos on the right show his wife. Following pairs are in birth order, starting at the second row - On the left: two daughters, one son. On the right: three sons. R: right eyes; L: left eyes.*

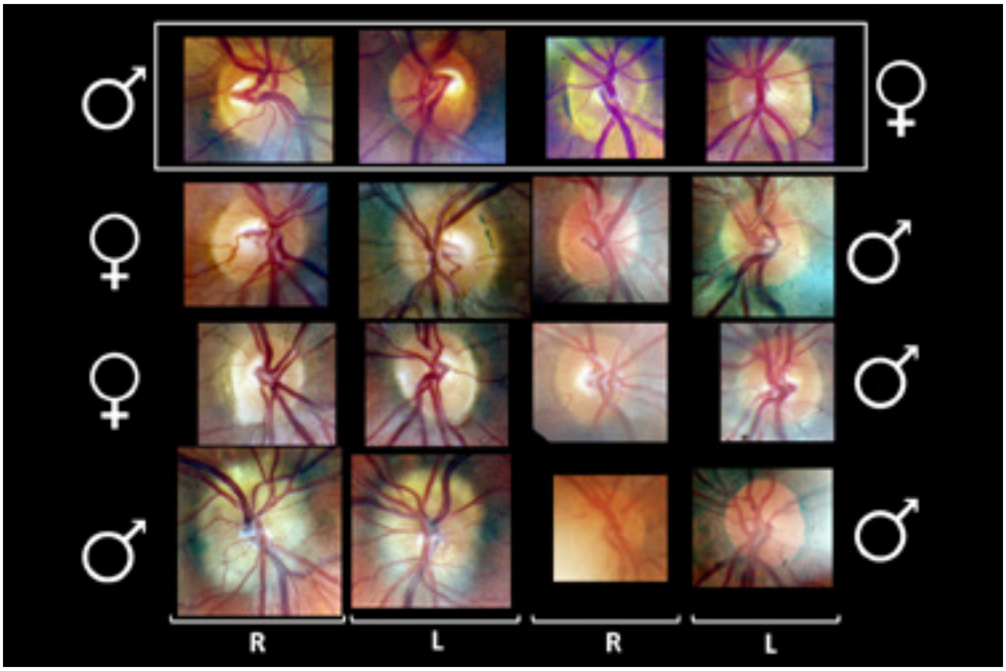
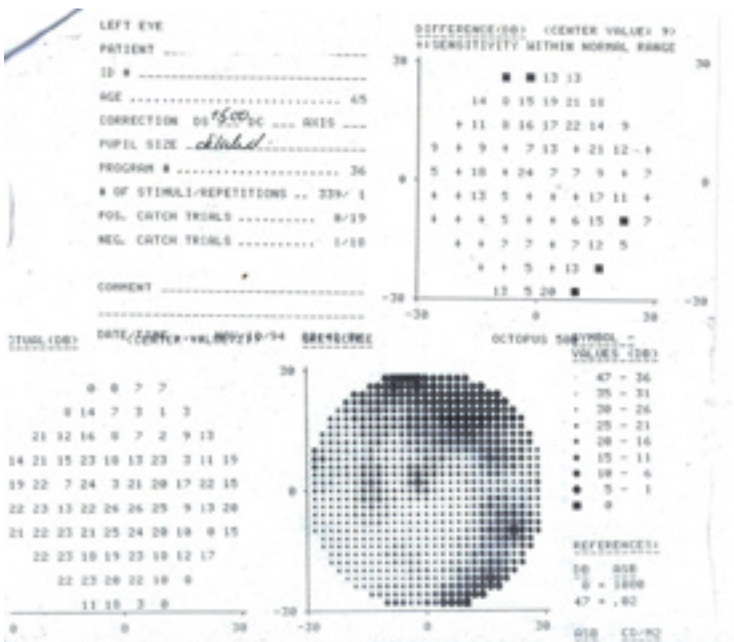


Fig. 2: *Octopus visual field test results for the left eye, 15 days prior to surgery for macroadenoma.*



CASE REPORT

In 1973, a 43-year-old male showed an unusual entrance of the central retinal vessels on his nerve heads (Fig. 1 top left). Corrected visual acuity for the left eye at that time was 20/15, while that for the right eye was on the order of 20/200. The poor acuity in the right eye may have been related to a car accident at age 4. The right eye also showed a unilateral esotropia. Both eyes were hyperopic in the 6 D range.

Since the rest of his family were being seen at the University of Waterloo Optometry Clinic at that time, their nerve heads were also photographed. His wife is shown in Fig. 1 top right. The couple had two daughters and four sons. All showed some degree of situs inversus of the nerve head blood vessels (Fig. 1 balance of photos). This is consistent with an autosomal dominant pattern of inheritance. These findings have been reported previously.[5]

In 1994, at age 64 y, the patient had a non-secretory (i.e. null cell) pituitary macroadenoma removed via transsphenoidal resection. The sequence of events leading to discovery of the tumor was as follows. The patient underwent cataract surgery in September 1994. Over the two months following cataract surgery, he experienced a decrease in left visual acuity from 20/50 to 20/200. Cystoid macular edema was ruled out. Visual field testing for the left eye (Fig. 2) showed decreased sensitivity in the superior nasal field, close to the center of the field. There was no afferent pupil defect, and extraocular muscle function was normal. When the patient mentioned to his eye surgeon that his brother had been diagnosed with a brain tumor in 1990, the eye surgeon ordered a brain scan to rule out a central cause for the loss of acuity. This scan revealed a macroadenoma, which was removed in late November 1994. Further visual field testing prior to and following removal of the macroadenoma (Fig. 3) showed a greatly improved left visual field after surgery; left visual acuity improved to 20/25, where it remains to date.

The vascular pattern of the optic nerve head is established by the seventh to eighth month of gestation.[6] Although the nerve head anomaly in this patient appears to have been present at birth, the pituitary problem was not noted until 64 years later.

Fig. 3. Goldmann visual field test results closer to the time of surgery: *A and B show the right and left field results 3 days prior to surgery; C is the left field result 3 days after surgery. In A, there is a central defect extending superotemporally. In B, there is a left superotemporal field defect. In C, the superotemporal field defect has resolved. Shaded areas are scotomas. Inner solid lines show isopters obtained with the Goldmann II-4 target; outer, broken lines are norms for 65 year olds obtained with the Goldmann III-3 target, which has a stimulus value equivalent to the II-4 target.*

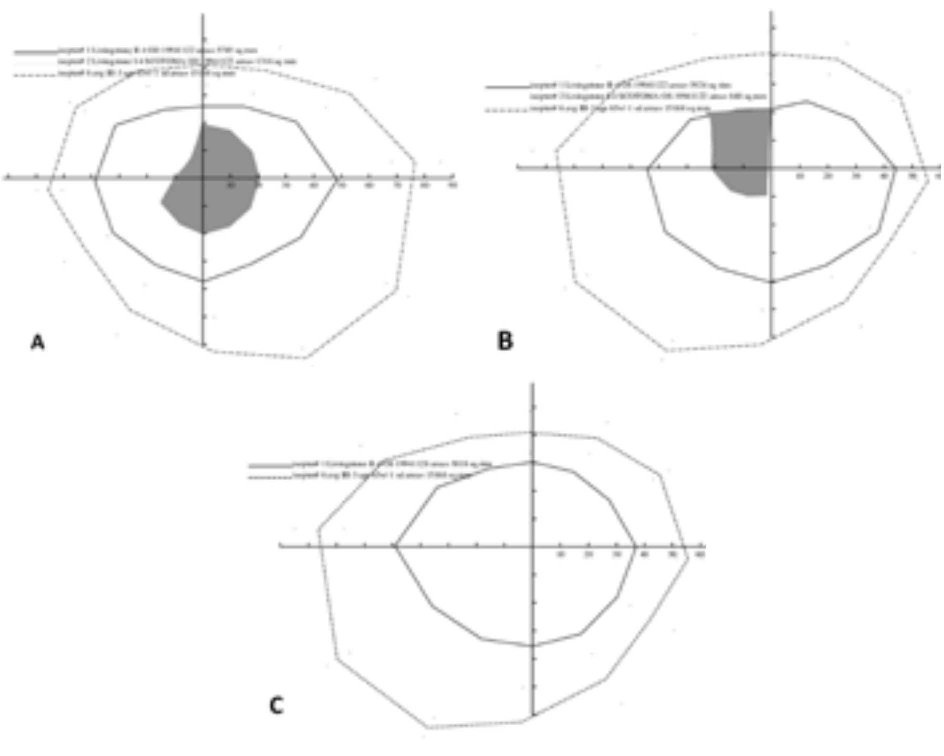
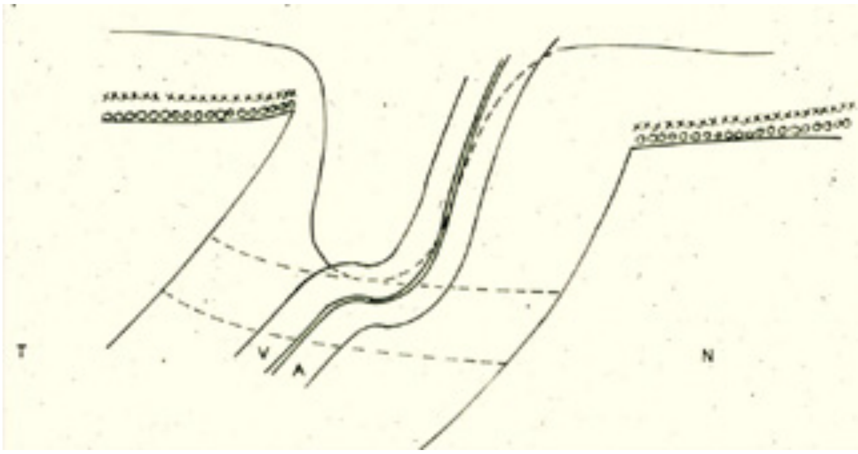


Fig. 4: *Hypothetical horizontal cross-section through the right nerve head of the patient. The strong temporal direction of the optic nerve causes the centrally-located central retinal vein and artery to appear toward the temporal edge of the nerve head. The dashed pair of lines in the lower part of the diagram represent the lamina cribrosa, while the curved dashed line in the upper part of the diagram represents the nasal part of the cupping. (Reproduced, with permission, from Williams TD. Congenital malformations of the optic nerve head. Am J Optom Physiol Opt 1978;55(10):706-18.)*



DISCUSSION

The association of nerve head colobomas and prolactinoma has been previously reported.[7] Colobomas may be associated with a wide range of congenital abnormalities, including cardiovascular, gastrointestinal, skeletal, and urogenital abnormalities. Hypoplasia or aplasia of the trigeminal nerve may occur in patients with nerve head colobomas.[8] I have previously reported another patient with situs inversus and chromophobe adenoma.[9]

Optic nerve anomalies can be associated with anomalies in the development of the central nervous system. An example is septo-optic dysplasia,[10] which features various combinations of optic nerve hypoplasia, pituitary hormone deficiencies, and midline abnormalities such as absence of the septum pellucidum. Optic nerve hypoplasia may also be associated with posterior pituitary ectopia and thinning of the corpus callosum.[11] For some patients with optic nerve anomalies, the associated CNS anomalies are present at birth, as in the case of the basal encephalocele associated with morning glory nerve head.[12] For other patients, CNS anomalies such as craniopharyngioma may not develop until adulthood. The embryonic basis for craniopharyngioma is clear. Craniopharyngioma, which arises from the adenohypophyseal placode (i.e. Rathke's pouch), may be associated with various congenital nerve head abnormalities (optic nerve hypoplasia, tilted disc).[13] One theory suggests that when craniopharyngioma presents in adulthood, this signifies that some embryonic tissue from the pharynx remained dormant (embryonic rest) for years, and then resumed its growth.[14] The posterior pituitary (neurohypophysis) can be abnormal, even ectopic, in some people with morning glory nerve head.[15] Morning glory nerve head is also associated with Down syndrome,[16] hypertelorism, cleft lip and palate, basal encephalocele, agenesis of the corpus callosum, defects in the floor of the sella turcica, renal anomalies and the CHARGE syndrome (Coloboma, Heart defects, Atresia of the nasal choanae, Retardation of growth and/or development, Genitourinary abnormalities, Ear deformities).[17]

Situs inversus of the retinal vessels of the optic nerve head is also likely associated with a strong temporal direction of the optic nerve as it leaves the globe.[18] Figure 4 shows a hypothetical horizontal cross-section of the present patient's right optic nerve head. Upon ophthalmoscopic examination, the trunks of the central retinal vessels will first be seen within the cupping close to the temporal edge of the nerve head. Under normal circumstances, one would expect the trunks of the central retinal vessels to be either at the center of the nerve head (where they would not be seen at all) or, as with many myopic fundi, the trunks of the vessels appear to have been tucked away on the nasal side of the nerve head, owing to a somewhat nasal direction of the optic nerve. This discrepancy led to the term 'situs inversus of the central retinal vessels', since the patient's right eye had a vascular pattern that was more like that expected in a left eye.

It may be that the optic nerve is pushed in this temporal direction by a disproportion in either the number or rate of growth of the ganglion cell axons, with fewer axons present on the temporal side of the nerve head and more axons present on the nasal side of the developing nerve. This mechanism may explain the great variation in the apparent direction of optic nerves: all directions appear to be possible.

The normal optic nerve, the temporally-directed optic nerve, and the hypoplastic optic nerve may lie along a spectrum of ganglion cell axon development: if there is no interference, the optic nerve will be normal, oriented at right angles to the globe of the definitive eyeball; if there is more interference with the growth of axons from the temporal retina than in other areas, then the partially hypoplastic optic nerve will be oriented temporally as it leaves the globe; if there is overall interference with axon growth, there will be an overall hypoplastic optic nerve, also oriented at right angles to the globe. In the partially hypoplastic case, the trunks of the central retinal vessels will appear toward the temporal edge of the disc.

The late appearance of an anterior pituitary tumor in the present case suggests the possibility of a similar embryonic rest in the region of the pituitary gland, and that the growth disturbance which caused placement of this anomalous tissue may have also caused the congenital anomaly involving the optic nerve.

There is no basis for concluding that all patients with situs inversus of the retinal vessels will later develop a pituitary tumor. This vascular pattern is relatively uncommon (occurring in 5% of eyes without a tilted disc[19]), while pituitary tumors are found one in six autopsy cases.[20] Nevertheless, patients who present with nerve head anomalies require further investigation to rule out other intracranial or systemic abnormalities. ●

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The Model T and a Peek Behind the Curtain?

Chris Wroten, O.D., *is a graduate of Southern College of Optometry (SCO) and a partner and Chief Operating Officer for the Bond-Wroten Eye Clinics. Dr. Wroten has participated in clinical research, authored clinical case reports and eyecare articles, lectured as a continuing education speaker, and presented educational posters and workshops at regional and national optometric conferences. In addition to primary eye care, his special areas of interest lie in the treatment and management of ocular disease and contact lenses.*

"Change is the law of life. And those who look only to the past or present are certain to miss the future."
– U.S. President John F. Kennedy

Change. The Future. Two similar, but complicated, concepts that many of us either fear due to uncertainty, or aggressively seek out due to the thrill of being on the cutting edge. If we're paralyzed by uncertainty, it's easy to get left behind as new and better opportunities emerge. On the flip side, it's easy to get burned by constantly chasing "the next great thing." Perhaps the most prudent course is to be constantly aware of what may lie on the horizon, while maintaining a grounded realization of potential implications for the present and future. If only things were so simple! Further complicating matters, our openness to the change the future potentially holds is affected by many variables, including our current position in life when things are going well and seemingly "on autopilot," we're often more resistant to change; but if we're down on our luck with "nothing to lose," change can be much easier to embrace.

Take, for instance, the automobile entrepreneur, Henry Ford, who revolutionized transportation around the world by innovating and "thinking outside the box." He brought the moving assembly line to the automotive industry, as well as around-the-clock factory shifts and local franchise dealerships, all while making the automobile affordable for the masses. Ford was handsomely rewarded for his innovations. At its peak, Ford Motor Company held a 50% market share, and Henry Ford's personal net worth in today's dollars is estimated to have been $188 Billion (for perspective, that's still $50B more than Bill Gates and Warren Buffett today...combined!)

Yet even Ford had problems embracing change later in his career. At one point, his engineers saw the public's desire for changes to the Model T that had brought Ford Motor Company to the pinnacle of the automobile industry (changes that their competitors began adopting), but Henry Ford refused to modify his design because "it wasn't the Ford way" and because the intoxication of success had bred a false sense of security and an accompanying resistance to change. This myopic insistence on maintaining the status quo drove Ford Motor Company from 50% market share to the brink of closure under the same leader, within just a few years. In fact, if Henry Ford's son hadn't taken over the company and made the necessary changes, Ford Motor Company would not exist today. As the old mantra goes, "To stay still, is to fall behind."

Similarly, a myriad of innovations and technologies are poised to potentially transform the practice of eye care in the coming decades. Let's take a brief peek behind the curtain at some of these, and consider what impact they may have on the quality of care we provide our patients and how we provide it.

PHARMACEUTICALS

It's nearly impossible to track even a fraction of all the compounds that are currently in various stages of research and development in the pharmaceutical industry: from medications such as a topical broad-spectrum antiseptic (yes, an *antiseptic*, not an antibiotic) paired with a corticosteroid for treatment of both adenoviral and bacterial conjunctivitis in children and adults,[1] to a topical, selective vascular endothelial growth factor (VEGF) inhibitor for wet age-related macular degeneration, diabetic retinopathy, and other forms of macular edema, whose efficacy rivals the currently available intravitreal anti-VEGFs.[2] In addition, how about an oral compound that's a synthetic derivative of testosterone and which enhances endothelial cell barrier function to treat diabetic macular edema?[3]

In the field of glaucoma, it's been over two decades since the introduction of a truly novel class of medication, but that may soon change. Latanoprostene bunod is close to coming to market as a topical medication that breaks down into latanoprost acid, the well-established prostaglandin analog, and nitric oxide, which further enhances aqueous outflow by acting directly on trabecular meshwork.[4] Further, an entirely novel class of glaucoma medications called Rho-kinase (ROCK) inhibitors is being developed by several pharmaceutical companies. ROCK inhibitors relax smooth muscle in trabecular meshwork to increase aqueous outflow, while also lowering episcleral venous pressure and further facilitating outflow, both of which are unique mechanisms of action that are not shared with any currently available glaucoma medications. Several ROCK inhibitors have also been paired with Nor-epinephrine Transport (NET) inhibitors, which suppress aqueous production, to give a triple mechanism of action.[5] Combinations of ROCK and NET inhibitors paired with a prostaglandin analog to enhance uveoscleral outflow are also being developed, which could offer a quadruple mechanism of action. Compounds such as these are just a small sampling of what's in the pipeline from various ophthalmic pharmaceutical companies.

DRUG DELIVERY

Not only are new compounds being created, but drug-delivery methods are also poised to potentially undergo radical changes. Sustained-release medications in the form of next-generation fornix-based inserts, punctal plug devices, intracanalicular inserts, and medicated contact lenses are in various stages of development by multiple manufacturers.[6,7,8] An ocular iontophoresis unit with a Prager shell-like device that uses a small electric current to drive medication into the eye is also being developed.[8] 3-D printing and nanotechnology are on the verge of drastically improving the efficacy of current and future pharmaceutical agents. What if we could prescribe medications at lower concentrations and dose them much less frequently than ever before, while at the same time drastically increasing their efficacy and reducing or possibly even eliminating unwanted side effects?

ASSISTIVE DEVICES

For our patients who have lost visual acuity, contrast sensitivity, and/or visual field, multiple companies are developing next-generation wearable devices that attach to a patient's spectacle frame, or come with a standalone frame, and audibly guide patients through the environment, and can even read labels and printed materials on command.

GENE THERAPY

No area of medicine holds more promise than gene therapy. In the U.S., the first gene therapy for inherited diseases, in this case for inherited retinal diseases, was recently approved.[9] Meanwhile, a husband and wife team at the University of Washington are investigating a cure for color vision defects in primates,[10] and are now moving into human trials using human recombinant DNA and a benign adenoviral vector to deliver a gene patch. While gene therapy is still a subject of debate, research is progressing rapidly in many other areas of eye care, including repairing and replacing damaged retinal pigment epithelial (RPE) cells and corneal epithelial cells. In both cases, pluripotent stem cells are harvested from a patient's own skin, then differentiated into the appropriate cell type. Imagine the possibility of curing, rather than just treating, the chronic and debilitating ocular diseases we encounter so often with our patients!

OCULAR SURGERY

Cataract surgery is also poised to have increasingly more procedures performed without general anesthesia, without the need for patients to use post-operative medications, and with multifocal intraocular lenses offering better vision (and less loss of contrast sensitivity). Numerous innovations in IOL design are being tested, including an auto-focusing IOL that uses an embedded computer chip and a self-contained battery. Glaucoma surgeries continue to become less invasive, including an ultrasound-based therapy that works much like selective laser trabeculoplasty (SLT) and newer aqueous shunt designs. The next generation of refractive surgery procedures is also emerging, such as small incision lenticule extraction (SMILE) and various corneal inlay procedures like KAMRA and Raindrop to treat presbyopia.

PHOROPTERS

Closer to home, how about a potential seismic shift in the way we refract patients? The developers of a "virtual phoropter" claim that it uses wavefront technology and computer-controlled, variable-power "virtual lenses" to drastically increase refractive accuracy versus traditional phoropters.[11] In combination with newly developed manufacturing technologies, this "virtual refracting platform" would allow spectacle lenses to be precisely manufactured to levels of refractive correction previously unseen. This platform also does away with the Snellen visual acuity chart by having the patient view a high-definition photo of a real-world situation during refraction. Could we even imagine refracting without a phoropter or without a Snellen chart?

We've only scratched the surface, as the list of new and emerging eye-care technologies goes on and on. Who could predict which, if any, of these might actually be "the next great thing"? What we do know is that just a fraction of new innovations are ever able to overcome the hurdles of disappointing real-world results, potentially exorbitant cost, lackluster adoption rates, poor design, and/or inadequate marketing to attain success, and only a microscopic portion of those will truly become game-changers. However, the sheer volume of innovations in the eye-care pipeline assures that there will be some game changers, so we would do well to remember the young Henry Ford, who embraced change, who innovated, and who adopted technology to improve the quality of life for those around him, and not follow the lead of the old Henry Ford, who fell behind and nearly ruined his company with a futile and myopic stubbornness to maintain the status quo in the face of progress.

Let's not fear what's behind the curtain, but rather honestly vet each innovation and advocate to protect patients from those that don't meet standards of care, while finding ways to embrace and appropriately implement new technologies and treatments that enhance our patients' quality of life and expand the scope of care we provide. If we do, the future of eye care is bright indeed! ●

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Le modèle T et coup d’œil derrière le rideau

Chris Wroten, D.O., *est diplômé du Southern College of Optometry et associé et chef de l’exploitation des Bond-Wroten Eye Clinics. Le Dr Wroten a participé à des recherches cliniques, rédigé des rapports d’observations cliniques et des articles sur les soins oculovisuels, donné des conférences en tant que conférencier de formation continue et présenté des affiches et des ateliers éducatifs dans le cadre de conférences optométriques régionales et nationales. Outre les soins oculovisuels primaires, ses domaines d’intérêt particuliers sont le traitement et la prise en charge des maladies oculaires et les lentilles cornéennes.*

« Le changement est la loi de la vie. Et ceux dont le regard est tourné vers le passé ou le présent sont certains de rater l’avenir. » – Le président des États-Unis John F. Kennedy

Le changement. L’avenir. Deux concepts similaires, mais compliqués, que bon nombre d’entre nous craignent en raison de l’incertitude, ou recherchent activement pour l’excitation d’être à l’avant-garde. Lorsque nous sommes paralysés par l’incertitude, il est facile de se laisser devancer, alors que naissent de nouvelles et meilleures possibilités. À l’inverse, on peut aisément se brûler en étant constamment à l’affût de « la prochaine grande avancée ». La démarche la plus prudente est sans doute d’être toujours au courant de ce qui se pointe à l’horizon, tout en maintenant une conception réaliste des répercussions potentielles pour le présent et pour l’avenir. Si seulement les choses étaient aussi simples! Pour compliquer davantage la situation, notre ouverture au changement que l’avenir peut nous réserver est façonnée par de nombreuses variables, notamment notre position actuelle dans la vie. Lorsque tout va bien et semble fonctionner « en pilotage automatique », nous offrons souvent une plus grande résistance au changement, mais si nous manquons de chance et n’avons « rien à perdre », il peut être beaucoup plus facile d’accepter le changement.

Prenons par exemple l’entrepreneur en automobile Henry Ford, qui a révolutionné les transports dans le monde entier en innovant et en « sortant des sentiers battus ». Il a instauré la chaîne d’assemblage mécanique dans l’industrie de l’automobile, de même que des quarts de travail d’usine en continu sur une période de 24 heures et des concessionnaires locaux franchisés, tout en rendant l’automobile accessible pour tous. Ford a été largement récompensé pour ses innovations. À son sommet, la Ford Motor Company détenait 50 % de la part du marché, et l’avoir personnel net d’Henry Ford en dollars d’aujourd’hui a été estimé à 188 milliards de dollars (pour mettre les choses en perspective, c’est encore 50 milliards de dollars de plus que la fortune de Bill Gates et Warren Buffett aujourd’hui… si l’on combine leurs avoirs!)

Pourtant, Ford lui-même a eu de la difficulté à faire place au changement plus tard dans sa carrière. À un moment donné, ses ingénieurs ont constaté que le public souhaitait qu’on apporte des changements au modèle T qui avait propulsé la Ford Motor Company au sommet de l’industrie automobile (des changements que ses concurrents commençaient à adopter), mais Henry Ford a refusé de modifier sa conception sous prétexte que ce n’était pas la façon de faire de Ford et parce que, grisé par le succès, il avait développé un faux sentiment de sécurité et la résistance au changement qui l’accompagne. Cette insistance myope à maintenir le statu quo a fait passer la Ford Motor Company d’une part de marché chiffrée à 50 % au bord de la fermeture, sous une même direction, en seulement quelques années. En fait, si le fils d’Henry Ford n’avait pas pris le contrôle de la société et apporté les changements nécessaires, la Ford Motor Company n’existerait plus aujourd’hui. Comme dit l’adage, « To stay still, is to fall behind »; l’inaction entraînera forcément un retard.

De la même façon, une myriade d’innovations et de technologies risquent de transformer la pratique des soins oculovisuels dans les décennies à venir. Jetons un bref coup d’œil derrière le rideau et envisageons l’incidence que pourraient avoir certaines de ces inventions et technologies sur la qualité des soins que nous offrons à nos patients et sur la façon de les fournir.

LES PRODUITS PHARMACEUTIQUES

Il est pratiquement impossible de faire le suivi même d'une fraction de tous les composés qui sont actuellement à divers stades de recherche et développement dans l'industrie pharmaceutique : des médicaments comme un antiseptique topique à large spectre d'efficacité (on parle bien d'*antiseptique* et non d'antibiotique) jumelé à un corticostéroïde pour le traitement des conjonctivites adénovirales et bactériennes chez les enfants et les adultes,[1] à un inhibiteur topique sélectif du facteur de croissance de l'endothélium vasculaire (VEGF) pour le traitement de la dégénérescence maculaire exsudative (humide) liée à l'âge, de la rétinopathie diabétique, et d'autres formes d'œdème maculaire, dont l'efficacité rivalise avec les anti-VEGF intravitréens actuellement accessibles.[2] Par ailleurs, que diriez-vous d'un composé oral qui est un dérivé synthétique de la testostérone et qui améliore la fonction de la barrière de cellules endothéliales pour traiter l'œdème maculaire diabétique?[3]

Dans le domaine du glaucome, deux décennies se sont écoulées depuis l'introduction d'une catégorie de médicaments vraiment nouvelle, mais cela pourrait changer sous peu. Le latanoprostène bunod est en voie d'être commercialisé à titre de médicament topique capable de se décomposer en acide de latanoprost, l'analogue bien établi de la prostaglandine, et en monoxyde d'azote, qui améliore davantage l'écoulement de l'humeur aqueuse en agissant directement sur le trabéculum cornéoscléral.[4] En outre, plusieurs compagnies pharmaceutiques sont en train de mettre au point une toute nouvelle catégorie de médicaments contre le glaucome appelés les inhibiteurs de la Rho-kinase (ROCK). Les inhibiteurs de ROCK détendent les muscles lisses dans le trabéculum cornéoscléral pour augmenter l'écoulement de l'humeur aqueuse, tout en réduisant aussi la pression veineuse épisclérale et en facilitant davantage l'écoulement, deux mécanismes d'action uniques qu'on ne retrouve dans aucun autre médicament contre le glaucome actuellement offert sur le marché. Plusieurs inhibiteurs de ROCK ont aussi été jumelés aux inhibiteurs du transport de la norépinéphrine, qui empêche la production de l'humeur aqueuse, afin d'offrir un triple mécanisme d'action.[5] Les combinaisons des inhibiteurs de ROCK et de norépinéphrine jumelées à un analogue de la prostaglandine pour améliorer l'écoulement uvéosclérale sont aussi en cours d'élaboration, ce qui pourrait offrir un quadruple mécanisme d'action. Les composés de ce genre ne sont qu'un petit échantillonnage de ce que préparent les diverses compagnies pharmaceutiques ophtalmiques.

ADMINISTRATION DES MÉDICAMENTS

Non seulement de nouveaux composés sont en voie de création, mais les méthodes d'administration des médicaments devraient aussi subir des changements radicaux. Les médicaments à libération prolongée, sous forme de dispositifs à la base du fornix de la prochaine génération, de bouchons méatiques, de dispositifs intracanaliculaires, et de lentilles cornéennes médicamentées, sont à divers stades de mise au point chez de multiples fabricants.[6,7,8] Une unité d'ionophorèse oculaire dotée d'un dispositif Prager de type coquille qui utilise un petit courant électrique pour transférer le médicament dans l'œil est aussi en cours d'élaboration.[8] L'impression 3D et la nanotechnologie sont sur le point d'améliorer considérablement l'efficacité des agents pharmaceutiques actuels et futurs. Et si nous pouvions prescrire des médicaments à des concentrations plus faibles et les prendre beaucoup moins fréquemment qu'auparavant, tout en augmentant considérablement leur efficacité et en réduisant ou peut-être même en éliminant les effets secondaires indésirables?

APPAREILS ET ACCESSOIRES FONCTIONNELS

Pour nos patients qui ont subi une perte d'acuité visuelle, de sensibilité aux contrastes ou de champ visuel, de multiples entreprises travaillent à la mise au point de dispositifs portables de la prochaine génération qui s'attachent à la monture des lunettes des patients ou qui se portent seuls, et qui guident vocalement les patients dans leur environnement et peuvent même lire les étiquettes et le matériel imprimé sur demande.

THÉRAPIE GÉNIQUE

Aucun autre domaine de la médecine n'est plus prometteur que la thérapie génique. Aux États-Unis, la première thérapie génique pour les maladies héréditaires, dans ce cas les maladies rétiniennes héréditaires, a été approuvée récemment.[9] Pendant ce temps, un couple de chercheurs de la University of Washington fait des recherches sur le traitement des défauts de perception de couleur chez les primates,[10] et passe maintenant aux essais sur des êtres humains en utilisant de l'ADN humain recombiné et un vecteur adénoviral bénin pour mettre en place le correctif génique. Si la thérapie génique fait toujours l'objet de débats, la recherche progresse rapidement dans bon nombre d'autres domaines des soins de la vue, notamment la réparation et le remplacement des cellules épithéliales des pigments rétiniens et des cellules épithéliales cornéennes endommagées. Dans les deux cas, les cellules souches pluripotentes sont récoltées à partir de la peau du patient traité, puis transformées dans le type approprié de cellules. Imaginez qu'on puisse guérir, plutôt que seulement traiter, les maladies oculaires chroniques et débilitantes que nous retrouvons si souvent chez nos patients!

CHIRURGIE DE L'ŒIL

L'intervention chirurgicale de la cataracte est sur le point de se faire de plus en plus souvent sans anesthésie générale, sans que les patients aient besoin d'avoir recours à des médicaments postopératoires, et avec des lentilles intraoculaires multifocales offrant une meilleure vision (et une moindre perte de sensibilité aux contrastes). Les nombreuses innovations dans la conception des lentilles intraoculaires font l'objet de mises à l'essai, notamment une lentille intraoculaire à la mise au point automatique qui utilise une puce informatique intégrée et une pile autonome. Les interventions chirurgicales pour le glaucome continuent d'être moins invasives, notamment la thérapie fondée les ultrasons qui fonctionne un peu comme la trabéculoplastie sélective au laser et les conceptions de shunt aqueux plus récents. On observe également le début de la prochaine génération d'interventions chirurgicales réfractives, comme la technique SMILE (small incision lenticule extraction) et diverses interventions d'incrustations cornéennes comme KAMRA et Raindrop pour traiter la presbytie.

RÉFRACTEURS

Plus près de nous, que diriez-vous d'une profonde transformation de la façon dont nous effectuons l'examen de la réfraction des patients? Les concepteurs d'un « réfracteur virtuel » allèguent qu'il utilise la technologie de front d'onde et des « lentilles virtuelles » de force variable gérées par ordinateur pour augmenter considérablement l'exactitude réfractive par rapport aux réfracteurs traditionnels.[11] Combinée à des technologies de fabrication récentes, cette « plateforme de réfraction virtuelle » permettrait de fabriquer avec précision des verres de lunettes atteignant des niveaux de correction réfractive jamais vus auparavant. Cette plateforme élimine aussi l'échelle de Snellen en montrant au patient une photo de haute définition d'une situation réelle pendant l'examen de la réfraction. Pouvons-nous seulement imaginer l'examen de la réfraction sans réfracteur ou sans échelle de Snellen?

Nous n'avons qu'effleuré la surface, puisque la liste des technologies nouvelles et émergentes liées aux soins oculovisuels n'en finit plus. Qui saurait prédire laquelle des technologies susmentionnées constituera « la prochaine grande avancée », le cas échéant? Ce que nous savons, c'est que seule une fraction des innovations peuvent un jour surmonter les obstacles que constituent les résultats décevants dans le monde réel, des coûts potentiellement exorbitants, de piètres taux d'adoption, une mauvaise conception ou une commercialisation inadéquate, pour connaître le succès, et que seule une proportion microscopique d'entre elles changeront vraiment la donne. Toutefois, le seul volume des innovations dans la filière des soins de la vue est une garantie que certaines d'entre elles changeront la donne. Par conséquent, il serait avisé de se remémorer le jeune Henry Ford, qui a accepté le changement, qui a innové, et qui a adopté la technologie pour améliorer la qualité de la vie des personnes qui l'entouraient, et de ne pas suivre l'exemple du vieil Henry Ford, qui a pris du retard et a presque ruiné son entreprise en raison de son entêtement futile et myope à maintenir le statu quo à l'égard du progrès.

N'ayons pas peur de ce qui se cache derrière le rideau, mais évaluons plutôt honnêtement chacune des innovations. Protégeons les patients des innovations qui ne respectent pas les normes de soins, tout en trouvant des moyens d'adopter et de mettre en œuvre adéquatement les nouvelles technologies et les nouveaux traitements qui améliorent la qualité de vie de nos patients et élargissent la portée des soins que nous offrons. De cette façon, l'avenir des soins de la vue sera effectivement brillant! ●

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Trends in Health Professions: Disclosure of Records to Third Parties

GOWLING WLG bms.

This article was prepared and written by the BMS Group Healthcare Professionals Insurance Alliance legal team of Gowling WLG (Canada) LLP (Gowlings), one of the largest and most highly-recognized legal firms in medical defence and professional liability in Canada. ***In the event of an actual or potential professional liability claim, CAO members who participate in the Professional Liability Insurance program are eligible for 30-minute pro bono and inclusive legal claims defence services from Gowlings.***
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The protection of a patient's personal health information is a key element of practising defensively. This article will provide some guidance regarding the steps that optometrists should take in response to a third-party request for the disclosure of confidential patient information to ensure that there is no breach of patient privacy.

Most optometry regulators have specific privacy-protection requirements for their respective licensees and members. In addition, federal and provincial privacy legislation sets standards that must be met, with the potential consequence of legal action should there be a breach.

Failure to properly protect a patient's confidential information can result in complaints to, and investigations by, your regulator as well as by the privacy commissioner. Further, it can expose you to civil liability under common law and privacy legislation. Failure to properly protect a patient's confidential information has the potential to interrupt your optometry practice and affect your professional reputation.

PRIVATE INFORMATION AND THE LAW

In Canada, personal health information is almost always considered sensitive personal information that is subject to privacy laws.[1] The collection, use and disclosure of personal health information requires the informed consent of the patient and that the information only be collected, used and disclosed for the purposes consented to by the patient. The requirement for consent is ongoing and if a new use or disclosure becomes necessary, but has not been consented to, you must obtain consent from the patient for that new use or disclosure, unless there is an exception or it would be inappropriate to do so.[2]

Federal and provincial privacy legislation sets parameters for the proper collection, use and disclosure of personal health information by private organizations and individuals. The federal statute governing personal information is the *Personal Information Protection and Electronic Documents Act* ("PIPEDA").[3] Some provinces have privacy legislation and PIPEDA does not apply where provincial legislation is declared "substantially similar".[4] In some provinces, legislation governing personal health information has not yet been declared substantially similar to PIPEDA.[5] In addition to federal and provincial legislation, a common law right to privacy is now recognized by some Canadian courts.[6] Therefore, ensuring compliance with privacy law may require consultation with legal counsel.

DISCLOSURE TO THIRD PARTIES

The need to disclose personal health information to third parties can arise in a wide variety of circumstances. A common example is where an optometrist determines the need to refer a patient to another regulated health professional (for instance, an ophthalmologist), for consultation or further treatment. In this instance, privacy laws deem that the consent to share information with the healthcare professional for a referral is covered by *implied consent* of the patient for the provision of health care, unless the patient has expressly withheld or withdrawn his or her consent.[7]

However, it is not uncommon for requests for disclosure of patient information to third parties to arise outside of the strict provision of health care. In these circumstances, it is important for you to carefully consider whether informed consent to disclose the information has been obtained, or is required in the particular circumstances.

Questions for optometrists to consider when determining whether informed consent has been obtained to permit disclosure of personal health information to a third party include:

- Who gave the initial consent to gather the personal health information of the patient?
- Does that individual who originally provided consent still have authority to consent?
- Is the initial consent still ongoing and did the initial consent provide for disclosure to a third party in a circumstance such as this?
- What other substitute decision-makers have authority to provide consent?

Satisfying yourself that you have the requisite consent to disclose personal health information to a third party is not always a straightforward task. The Information and Privacy Commissioner of Ontario's guidelines provide a good example of how competing interests can make consent to disclosure a potential minefield for healthcare professionals.[8] To assist, we have outlined some common examples below.

Patient is a minor or has a disability

When the patient is a minor or has a disability, the consent to disclose personal health information may require the written consent of a parent or legal guardian.[9]

Imagine that a fourteen-year-old patient comes to you for an optometric assessment, accompanied by her father who has rights of access under a child custody arrangement with the mother, who has custody of the teen. Prior to the optometric assessment, the teen was involved with learning support staff at her school, and the father wishes the optometrist to provide them private information about the assessment. Can the optometrist disclose private information at the request of the father alone?

The short answer in this circumstance is most often 'no'. Under privacy law, for minors, the right to consent on their behalf generally only rests with a substitute decision-maker. Parents with custody of the minor, not those with mere access rights, generally have the authority necessary to consent to disclosure on behalf of the minor. However, even minors who have themselves made the decision to consent to treatment can also provide consent to disclose personal health information to third parties, provided that this consent is informed and expressed.[10]

You receive a court order, summons or subpoena

If the request for disclosure to a third party is required by law (for example, pursuant to a court order), then the informed consent of the patient is not required under privacy law. Upon receipt of a court order, summons or subpoena, you should review the document carefully to determine when you are required to disclose the information (i.e. if you receive a summons or subpoena, you may only need to bring the pertinent documents with you when you are required to attend at Court on a specified date). You should also call the individual (most often a lawyer) who provided the court order, summons or subpoena to discuss the scope of the documentary request.

When such an order is received, a best practice would also be to inform the patient of the court order, summons, or subpoena prior to making the disclosure.

Requests from a third party with a signed patient authorization

Sometimes, health professionals will receive a third-party disclosure request from a patient's lawyer or representative. Typically, these requests will be accompanied by a signed consent form from the patient. When such a request is received, best practice is always to contact the patient directly to confirm the patient's consent and to discuss the information that will be disclosed pursuant to the request. This will ensure that the patient's consent is informed and the patient understands the content of the record prior to it being disclosed. Optometrists should keep detailed records of these conversations.

Sometimes a third-party request will include a request for information or confirmation that a certain event, injury, or accident had an effect on the patient's health status. For example, consider a patient who sustained injuries in a motor vehicle accident resulting in legal action. An optometrist receives a request from the patient's lawyer to provide past exam information including any "proof" establishing that the patient's eyesight was affected by the accident.

First, it is important for health professionals to distinguish between a role as a treating health professional and a role as an expert. In these circumstances, the optometrist may ultimately provide records and factual information arising from treatment of the patient that will ultimately assist the patient in establishing their claim. However, the role of the treating professional does not include providing expert opinion. If such a request is received, optometrists should clarify their role with the patient and the lawyer.

Fees for disclosure requests

When a request is made for the disclosure of a patient's record, optometrists are typically entitled to request a reasonable fee for providing such records. Optometrists should consult their provincial association's fee guides, which usually set standard fees for record-related requests. As a general principle, any fees charged should be reasonable, and best practice is to ensure they are consistent with the suggested fees established by the local provincial association.

Finally, optometrists must always remember to inform, preferably in writing, the individual providing the informed consent and the third party receiving the information of the purpose for which the information is being disclosed and any conditions on its disclosure. You should always keep records of the informed consent, the disclosure itself, and the purposes and conditions of the disclosure to the third party. In addition, if the information that was disclosed changes or is discovered to be incorrect, you may be under an obligation to update the third party of such changes or corrections and a provision for that scenario should be expressly stated in the patient's consent to disclose to the third party.[11]

Informed consent is a baseline requirement for the provision of health care, as well as for the use and disclosure of personal health information. Optometrists who are conscientious of their patient's privacy rights and their professional duty to protect privacy will obtain informed consent to disclose information to third parties, and will systematically document those disclosures in accordance with the standards of the professional regulator. ●

Please note that this commentary is not, nor should it be considered, legal advice and should not be relied upon as such. Should you have any questions regarding patient/client privacy rights as it relates to your practice, please contact your provincial association, your provincial regulator and/or consult legal counsel.

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2. The Model Code for the Protection of Personal Information under PIPEDA states that: "In certain circumstances personal information can be collected, used, or disclosed without the knowledge and consent of the individual. For example, legal, medical, or security reasons may make it impossible or impractical to seek consent. When information is being collected for the detection and prevention of fraud or for law enforcement, seeking the consent of the individual might defeat the purpose of collecting the information. Seeking consent may be impossible or inappropriate when the individual is a minor, seriously ill, or mentally incapacitated. In addition, organizations that do not have a direct relationship with the individual may not always be able to seek consent. For example, seeking consent may be impractical for a charity or a direct-marketing firm that wishes to acquire a mailing list from another organization. In such cases, the organization providing the list would be expected to obtain consent before disclosing personal information."
3. PIPEDA, Sched 1, supra note 1.
4. Provincial statutes that have been declared "substantially similar" to PIPEDA by the federal government include: Personal Information Protection Act, SBC 2003, c 63; Personal Information Protection Act, SA 2003, c P-6.5; Personal Health Information Protection Act, 2004 SO, c 3; An Act respecting the protection of personal information in the private sector, RSQ c P-39.1; Personal Health Information Privacy and Access Act, SNB 2009, c P-7.05; Personal Health Information Act, SNL 2008, c P-7.01.
5. Provincial health information statutes that have not been declared "substantially similar" to PIPEDA include: Personal Health Information Act, CCSM c P33.5; Personal Health Information Act, SNS 2010, c 41; The Health Information Protection Act, SS 1999, c H-0.021.
   General privacy legislation that has not been declared "substantially similar" to PIPEDA includes: Access to Information and Protection of Privacy Act, RSY 2002, c 1; Freedom of Information and Protection of Privacy Act, RSPEI 1988, c F-15.01; Access to Information and Protection of Privacy Act, SNWT (Nu) 1994, c 20.
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10. Guide to PHIPA, ibid at 13,14.
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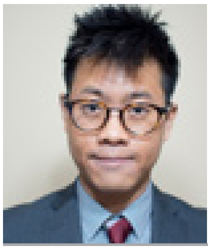
BOOK REVIEW

Biomaterials and Regenerative Medicine in Ophthalmology: Second Edition

Edited by Traian V. Chirila and Damien G. Harkin
Publisher: Woodhead Publishing, Elsevier



William Ngo, OD, PhD, FAAO
UAB School of Optometry
The University of Alabama at Birmingham
Birmingham, Alabama, USA

Biomaterials have wide and diverse applications in the various disciplines within medicine. These "natural material emulators" are used to construct artificial joints, stents, implants, biosensors, contact lenses, and drug-delivery systems. The development and engineering of biomaterials are extremely complex, and require an understanding of both the laboratory and clinical sciences to fully appreciate. This book is part of the Woodhead Publishing Series in Biomaterials, a collection of books (115 books) that discuss biomaterials in nearly every medical application.

This book reviews the scientific literature, and the development and applications of biomaterials in ophthalmology. Based on a consideration of the specific roles biomaterials have within the various parts of the eye, this book is structured into four major parts:

1) Materials, properties, and considerations. This section provides a brief overview of hydrogels and their design, considerations, and applications in contact lenses and vitreous substitutes. Biomaterials used in intraocular drug-delivery and their associated challenges are also discussed.

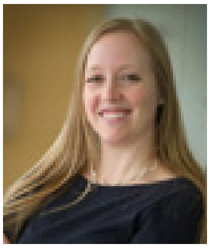
2) Biomaterials for the repair and regeneration of the cornea and ocular surface, and 3) for the repair and regeneration of the retina. These two sections discuss the use of biomaterials to restore tissues and functions of the ocular surface and retina. The former section elaborates on the different types of scaffolds that have been designed for the regeneration and reconstruction of corneal tissue. Limbal stem cell deficiency is discussed, along with the use of contact lenses to deliver stem cells to restore the ocular surface. The latter section discusses the nature and challenges of transplanting scaffolds, retinal ganglion cells, retinal pigment epithelium, and pluripotent cells.

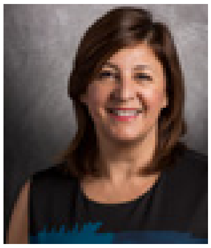
4) Other applications of biomaterials in ophthalmology. This section mainly discusses design and biocompatibility concepts regarding implants and prostheses, intraocular lenses, specialized glaucoma drug-delivery devices, and artificial corneal tissues.

This book has achieved its goal of reviewing the applications of biomaterials and regenerative medicine in ophthalmology. It reviews and reports on the main findings and results of various scientific studies, which range from in vitro laboratory experiments to experimental case studies. Each chapter begins with a brief introduction to provide relevant background information, and concludes with a discussion of future trends and challenges associated with the topic. As can be expected in a review, the specific details of the methods and procedures used in these studies are not provided. However, this does not pose much of a problem since all sources are cited. This book will be well-suited for those who are looking to gain a modern perspective on the application of biomaterials and regenerative medicine in ophthalmology.

REVIEW

Magical Moments in Anaheim!
2016 Annual American Academy of Optometry Meeting





Kristine Dalton, OD, PhD, MCOptom, FAAO, FBCLA
AAO Faculty-Student Liaison for Waterloo
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Etty Bitton, OD, MSc, FAAO, FBCLA
AAO Faculty-Student Liaison for Montreal

There seemed to be magic in the air at the 2016 Annual American Academy of Optometry meeting in Anaheim, California. The meeting once again set an attendance record of 7,720 attendees representing 53 nations. A total of 315 Canadians made the trip south, including 81 students from Quebec (Figure 1), 32 students from Waterloo, and a significant number of former UW students from the Waterloo class of 2016 (Figure 2).

Fig 1: *An impressive 119 attendees from Quebec were at the meeting, including a record number (81) of students.*

Fig 2: *Current and former UW students and residents reunited at the Second Annual Canadian School Alumni & Friends Reception*

In addition to the attendance record, the annual meeting saw a record number of Fellows join the Academy. The largest-ever fellowship class consisted of 267 candidates, including 13 Canadians, all of whom earned the distinction FAAO at this year's meeting (Figure 3). The 2016 class of Canadian Fellows can be found in Table 1 – Congratulations to all!

Fig 3: *Etty Bitton (representing UM), Debbie Jones (Interim Director of UW) and Lyndon Jones (Director of the CCLR) welcome the group to the Canadian Alumni & Friends reception.*

Table 1: *New Fellows from Canada in 2016*

Name	Province
Benoit Tousignant	Quebec
Blake Dornstauder	Alberta
Debby Yeung	Ontario
Estefania Chriqui	Quebec
Kalpana Rose	Ontario
Krista Bruni	Ontario
Luigi Bilotto	Quebec
Michelle Chan	Ontario
Mohamed Moussa	Ontario
Nicole Maierhoffer	Saskatchewan
Stephanie Britton	Ontario
Vincent Moore	Quebec
Yuen Ying Jacqueline Chan	Alberta

Fellows of the AAO include optometrists, scientists, educators, librarians, administrators, and editors who have demonstrated a commitment to pursuing optometry and vision science at the highest level – either in practice or in the pursuit of professional excellence. To become a Fellow of the AAO, candidates must have accumulated 50 points through written work (for more details, see http://www.aaopt.org/becoming/efellowship) before they are invited for a peer-review interview process at the annual meeting.

Fellows of the AAO are eligible to join any (or all) of the numerous sections or special interest groups (SIGs) the Academy offers. Sections of the Academy include groups such as the Low Vision Section, the Glaucoma Section, the Comprehensive Eye Care Section, the Section on Cornea, Contact Lenses and Refractive Technologies, and the Optometric Education Section, amongst others. SIGs include groups such as the Fellows Doing Research SIG and the Nutrition, Disease Prevention and Wellness SIGs. More details on the AAO's sections and SIGs can be found on the AAO website (http://www.aaopt.org/sections-sigs).

Fellows of the Academy are now required to participate in a Maintenance of Fellowship (MOF) program, which requires that they obtain 15 points over a period of 10 years. Points can be obtained in a variety of ways, including attending the annual meeting, volunteering for the AAO and presenting in either the scientific or continuing education programs. Details of the MOF program can also be found on the Academy's website (http://www.aaopt.org/fellows/mof). It is important to note that the MOF program requirements only apply to Fellows who obtained their fellowship in 2010 or later; they do not apply to Fellows who obtained their fellowship in 2009 or earlier.

In addition to the 12 new Canadian FAAOs honoured in 2016, 8 students from Waterloo and an impressive 54 students from Montreal (new records for both schools) completed their Student Fellowships. Student fellowships require students to participate in several different aspects of the AAO meeting to gain a better understanding of all that the AAO has to offer. To complete a Student Fellowship, students must attend different activities during the meeting, such as a poster session, lectures, a symposium, the exhibit hall to meet vendors, etc. Student Fellows of the AAO are recognised with a certificate and a pin after the meeting – congratulations to all our new Student Fellows!

This meeting marked the second anniversary of the now annual Canadian School Alumni & Friends Reception, co-hosted by the University of Waterloo, University of Montreal and Center for Contact Lens Research (CCLR). Dr. Etty Bitton (on behalf of Montreal) and Dr. Debbie Jones (Interim Director of Waterloo) brought news and greetings from both of their institutions and Dr. Lyndon Jones (Director of the CCLR) represented CCLR (Figure 4), while classmates, colleagues and friends enjoyed the opportunity to catch up over delicious food and drinks.

Fig 4: *Educators from Canadian optometry schools receive their FAAO. (Drs. Benoit Tousignant (UM), Debbie Yeung (UW), Stephanie Britton (UW), Stephanie Chriqui (UM), Luigi Bilotto (UM)) Congratulations to all!*

Fig 5: *Etty Bitton (UM), Sruthi Srinivasan (UW), Tanya Polonenko (UW, private practice), William Ngo (UW) and Sarah Aumond (UM) catch up at the Second Annual Canadian Alumni & Friends reception*

Not only were Canadians making their presence known through their attendance at the meeting, but the Canadian schools once again made a strong contribution to the scientific and continuing education programs.

Students, graduate students, research associates, adjunct faculty, and faculty from both of the Canadian Schools of Optometry were responsible for an impressive 58 items in the program, including CE talks, scientific presentations, workshops and symposiums (Figures 6-9). Details of these presentations can be found in Tables 2-5.

Table 2: *Contributions from faculty, research associates and post-doctoral fellows of the École d'optométrie, Université de Montréal*

Author (s)	Title of presentation	Type of presentation
Bitton E	Daily Disposables: Taking it one day at a time	CE Conference
Bitton E, Crncich V, Brunet N	Does a temperature change affect the comfort of artificial tears?	Poster
Hanssens JM, Roddy G, Ellenberg D	Ocular physiology exercised induced changes in intraocular pressure is related to systemic dehydration	Poster + 3min talk
Hanssens JM, Lacroix E, Voyer P, Diaconu V, Frenette B	Tint intensity and size of sunglasses influence the pupil diameter in bright-light conditions	Poster
Michaud L	1) Rapid fire: Controversies in contact lenses 2) Ellerbrock presents: Grand rounds II 3) Scleral or hybrids: The ultimate showdown 4) Scleral lens workshop	1) CE Conference 2) CE Conference 3) CE Conference 4) Workshop
Kergoat H, Irving EL, Law C, Chriqui E, Kergoat MJ, Leclerc BS, Panisset M, Postuma R	Feasibility study for orthoptic treatment of convergence insufficiency in Parkinson's disease	Poster

Table 3: *Contributions from faculty, research associates and post-doctoral fellows of the School of Optometry and Vision Science, University of Waterloo*

Authors (s)	Title of presentation	Type of presentation
Adams A, Jones L, Papas E, Markoulli M, Gifford P, Willcox M, Subbaraman L	OVS presents: Revolutionary uses of contact lenses	CE Conference
Back A, Chamberlain P, Logan N, Jones D, González-Méijome J, Saw SM, Young G	Clinical evaluation of a dual-focus myopia control 1-day soft contact lens: 2-year results	Paper
Babu R, Raveendran RN	Suppression on the Worth-4-Dot test and its relationship to stereo acuity	Poster
Belmonte C, Simpson T, McNamara N	Monroe J. Hirsch Memorial Research Symposium: The Distressed Eye: Ocular Pain	Symposium Speaker
Chamberlain P, Back A, Jones L, Logan N, Peixoto de Matos S, Saw S, Young G	Parental perspectives on their child wearing daily disposable soft contact lenses in a multicenter clinical study	Poster
Chamberlain P, Back A, Woods J, Logan N, Peixoto de Matos S, Saw S, Young G	Wearer experience and subjective responses with a dual focus myopia control 1-day soft contact lens	Poster
Christian L, Steenbakkers M, MacIver S	Evaluation of the attitudes of interprofessional education in optometry students	Poster
Dalton K, Willms A	Establishment of coincidence anticipation baseline measures	Poster
Dalton K, Willms A	Visuomotor reaction time deficits in athletes with a history of concussion	Poster

Furtado NM, Tsang TH, Ho DY	Comparative study examining various approaches to reducing exposure to high-energy visible light from digital devices	Poster
Haines L, Giddens E, Sorbara L	Retrospective review of scleral contact lens fitting at a contact lens clinic in an academic institution	Poster
Heynen M, Qiao H, Subbaraman L, Scales C, Riederer D, Fadli Z, Jones L	Location of non-polar lipids in monthly replacement silicone hydrogel contact lens materials	Poster
Hrynchak P, Labreche T	Residency In-training Evaluation Report (ITER) as an assessment method	Poster
Irving EL, Sivak A, Spafford MM	What the public knows and doesn't know about eye care and eye care professionals	Paper
Subbaraman L, Applegate R, Walline J, Bakaraju R	Ezell Fellows present: The future of optical interventions is now	Session Moderator
Kaminski J, Sheedy J, Woods J, Cunningham D	Vision in Aging SIG symposium: Presbyopia: Contemporary options for the modern patient	Symposium Speaker
Kergoat H, Irving EL, Law C, Chriqui E, Kergoat MJ, Leclerc BS, Panisset M, Postuma R	Feasibility study for orthoptic treatment of convergence insufficiency in Parkinson's disease	Poster
Ngo W	Challenges in dry eye research	CE Conference
Ngo W, Srinivasan S, Jones L	Comparison of dry eye tests between symptomatic and asymptomatic age-matched females	Poster
Nosch D, Pult H, Purslow C, Albon J, Murphy P	Is there a correlation between the degree of iris pigmentation and corneal sensitivity?	Poster
MacIver S	Papers: Public Health and Patient Quality of Life	Session Moderator
MacIver S, Christain L	A collaborative primary eye care model to improve adherence to eye exams in patients with Type 2 diabetes mellitus	Paper
MacIver S, Harrison W, Ruskin D, Chous AP	A screening dietary questionnaire can help identify individuals at higher risk for macular degeneration	Poster
Moezzi A, Varikooty J, Luensmann D, Ng A, Schulze M, Karkkainen T, Xu J, Jones L	Open-eye clinical performance of etafilcon A multifocal daily disposable hydrogel contact lenses compared to habitual silicone hydrogel lens wear	Poster
Pang PCK, Lam CSY, Ko KC, Chu G, Chan LYL, Hess RF, Thompson B	Change of fixation stability, visual acuity and stereopsis in mild amblyopes after home-based dichoptic video game training	Poster
Pucker A, Jones-Jordan L, Kwan J, Kunnen C, Srinivasan S	Race, ethnicity, and lifestyle choice associations with meibomian gland atrophy	Paper
Schulze M, Wong A, Haider S, Ebare K, Fadli Z, Coles-Brennan C, Jones L	Blink rate in silicone hydrogel contact lens wearers during digital device use	Poster
Sivak A, Spafford MM, Irving EL	Patient views on internet purchasing of eyewear	Poster + 3min talk
Situ P, Simpson T, Begley C	Effects of experimental tear film instability on sensory responses to corneal cold stimuli in symptomatic and asymptomatic contact lens wearers	Paper

Table 4: *Presentations by optometry students from Canadian schools*

Authors (s)	Title of presentation	Type of presentation
Keeling A, Leat SJ, Zecevic AA, Hileeto D, Labreche T, Brennan D, Brymer C (Waterloo)	Vision loss and falls among hospital in-patients: A case-control study	Poster
Le-Minh LA, Hanssens JM (Montreal)	Establishing a template for quality assurance guidelines in a large clinical setting	Poster
Milner-Lorti E, Radic D, Bitton E (Montreal)	The effect of curvature and mire resolution on different NIBUT instruments	Poster
Picioreanu S, Thompson B, Dalton K (Waterloo)	Motor ocular dominance varies with test distance but sensory ocular dominance does not	Poster
Zakem M, Bitton E (Montreal)	Prevalence of Demodex folliculorum in a dry eye clinic setting	Poster

Table 5: *Presentations by residents and graduate students from Canadian schools*

Authors (s)	Title of presentation	Type of presentation
Alabdulkader B, Leat S (Waterloo)	Design and testing of the new BL Arabic continuous text near-acuity charts	Poster
Alghamdi M, Vallis LA, Hileeto D, Leat S (Waterloo)	The association between visual attention and body movement-controlled video games, balance and mobility in older adults	Poster
Muntz A, Subbaraman L, Jones L (Waterloo)	Is there an association between lid wiper epitheliopathy, lens type and contact lens discomfort?	Paper
Phan C, Walther H, Riederer D, Smith R, Subbaraman L, Jones L (Waterloo)	Determination of the release of wetting agents from nelfilcon A using a novel in vitro eye model	Poster
Qiao H, Phan C, Walther H, Subbaraman L, Jones L (Waterloo)	Localizing lysozyme deposition on contact lenses using a novel in vitro eye model	Paper
Rose K, Krema H, Durairaj P, Dangboon W, Chavez Y, Kulasekara S, Hudson C (Waterloo)	Retinal perfusion changes in developing proliferative retinopathy post-brachytherapy for choroidal melanoma	Paper
Walther H, Phan C, Qiao H, Liu Y, Subbaraman L, Jones L (Waterloo)	In vitro eye model to simulate the impact of blinking on contact lens deposition and drug delivery	Paper
Yeung D, Sorbara L, Markoulli M (Waterloo)	MMP-9 and TIMP-1 analysis in tears of scleral lens wearers: Pilot study	Paper

Fig 6: *Helene Kergoat (UM) and Elizabeth Irving (UW) collaborated on a study on binocular vision problems in patients with Parkinson Disease.*

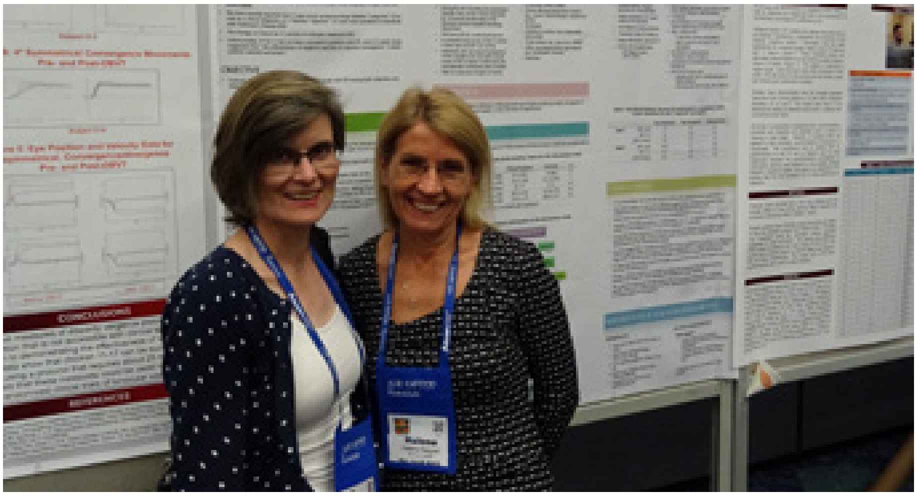


Fig 7: *(A) Michelle Zakem, UM optometry student, and (B) Sergiu Picioreanu, UW optometry student, presented their first-ever posters at the AAO.*

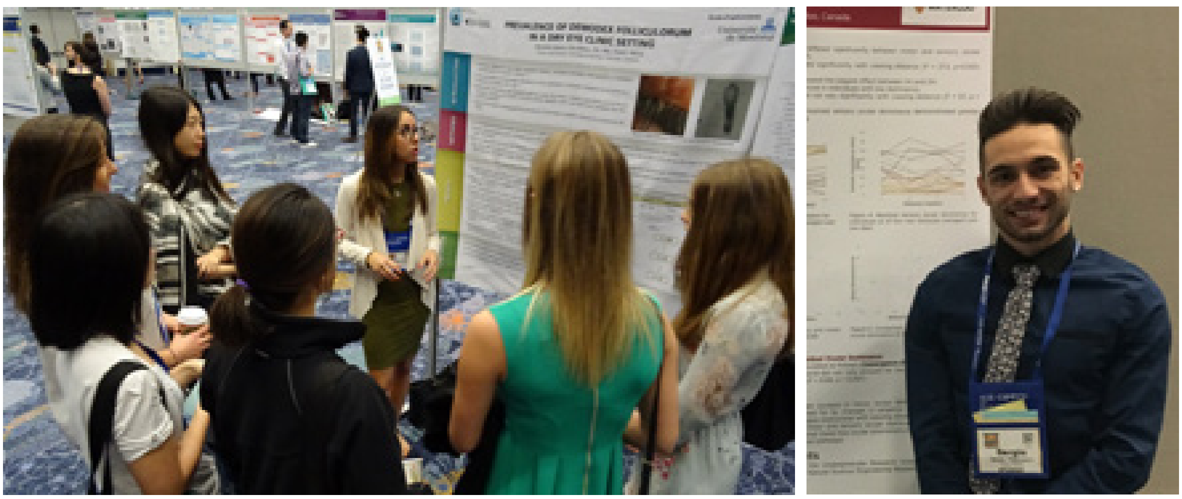


Fig 8: *Miriam Heynen, research associate at the CCLR, presenting her first poster at the AAO.*

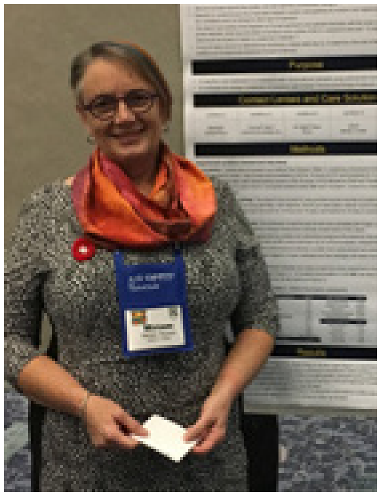
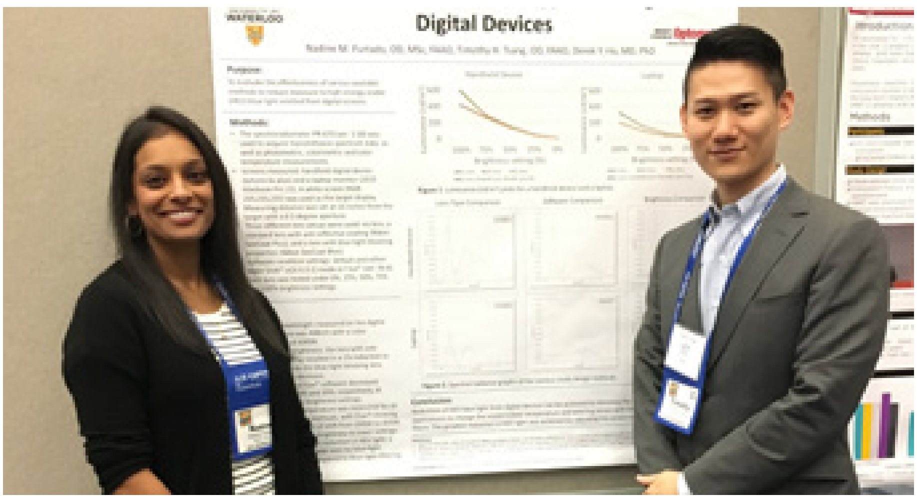


Fig 9: *Nadine Furtado (UW) and Timothy Tsang (private practice) collaborated on a study examining various approaches to reducing exposure to high-energy visible light from digital devices.*



Trefford Simpson from UW was one of three speakers honoured in the Monroe J. Hirsch Memorial Research Symposium, "The Distressed Eye: Ocular Pain". Alisa Sivak, Marlee Spafford and Elizabeth Irving's poster "Patient Views on Internet Purchasing of Eyewear" (UW) and Jean-Marie Hanssens, G Roddy and Dave Ellenberg's poster "Ocular physiology exercised induced changes in intraocular pressure is related to systemic dehydration" (Montreal) were both selected by the Academy Communications Committee as two of the ten most-newsworthy posters at the 2016 Annual Meeting, and the authors were invited to present their research at the annual press conference. (Figure 10).

Fig 10: *Marlee Spafford, Alisa Sivak and Elizabeth Irving (UW) at their newsworthy poster "Patient Views on Internet Purchasing of Eyewear.*

Several optometry students from both schools also won awards.

J. Pat Cummings Scholarship
Brij Patel (3rd yr student, Waterloo)
Michelle Zakem (3rd yr student, Montreal)

Award of Excellence in Contact Lens Patient Care (Johnson & Johnson Vision Care, Inc.)
Paul Lamothe, OD (Class of 2016, Montreal)
Alexis Keeling, OD (Class of 2016, Waterloo)

AOF –VSP/FYi Doctors Scholarship
Victoria Lomax (4th yr student, Waterloo)
Karin Lypka (4th yr student, Waterloo)
Solange Lacroix (4th yr student, Montreal)
Annie-Pier Leblanc (4th yr student, Montreal)

Essilor Student Travel Fellowship
Alexander McKeen, (3rd yr student, Waterloo)
Maxime MacGregor (4th yr student, Montreal)

Student Travel Fellowship funded by an educational grant from Johnson & Johnson Vision Care, Inc.)
Sergiu Picioreanu (3rd year student, Waterloo)
Han Qiao (MSc candidate, Waterloo)
Kalpana Rose (PhD candidate, Waterloo)
Hendrik Walther (PhD candidate, Waterloo)
Michelle Zakem (3rd yr student, Montreal)
Lili-Anh Le Minh (4th yr student, Montreal)
Eric Lortie-Milner(4th yr student, Montreal)

Allergan Resident Travel Fellowships
Caroline Plasse (OD, Montreal)
Anne-Sophie Buteau (OD, Montreal)

Award recipients from the 2016 meeting included Alan Tomlinson (honorary degree-holder from UW), who received the Section on Cornea, Contact Lenses & Refractive Technologies Founders award, and Tammy Labreche and Kristine Dalton (UW), who received a Fredrick Rosemore Low Vision Education Grant. Several students from both schools were also recognized with travel grants and scholarships (listed below). Congratulations to all of the 2016 honorees and award recipients!

Finally, a trip to the annual AAO meeting would not be complete without attending the always interesting and thought-provoking plenary session. Canada's own Malcolm Gladwell (best-selling author, *The Tipping Point, Blink, Outliers*) spoke about the Current State of Healthcare and Research. Gladwell presented a very interesting discussion of the types of problems we face when making decisions about healthcare today, including "puzzles" (where we have too little information) and "mysteries" (where we have too much information). As we enter the age of big data and personalized medicine, Gladwell's analysis of the dilemmas faced by healthcare was startlingly accurate.

Fig 11: *Malcolm Gladwell speaking at the AAO Plenary Session: Current State of Healthcare and Research.*

Looking back on the 2016 AAO meeting in Anaheim, it is apparent that there really was something magical about the Happiest Place on Earth! In October 2017, the Academy meeting was held in Chicago, Illinois. The report on Canadian contributions to the 2017 Annual Meeting of the American Academy of Optometry will be in the next issue.