Introduction and the Importance of Diet

A fter several years in the practice of health care and watching an increase in immune-complex disorders, inflammatory disorders and degenerative diseases, I believe it is time for the health care community to initiate Cross-Talk. One recent study reports a healthy lifestyle combining not smoking, a healthy weight, a healthful diet including moderate alcohol consumption, and daily exercise reduced ischemic strokes by approximately half in both men and women. The transfer of this critical information to all health care providers is important to the long-term health of all. This represents the essence of the Cross-Talk.

Most specialties and sub-specialties are publishing discoveries within their own journals without communicating those findings to other disciplines in spite of the fact that the results may have direct impact on the management of a different body system. As an example, how many health care practitioners who treat herpes zoster have read: "Herpes zoster. The treatment and prevention of neuralgia with adenosine monophosphate." Thirty-two adults were enrolled in a randomized, placebo-controlled double-blind trial of intramuscular injections of gel-sustained adenosine monophosphate (AMP) given three times a week for up to four weeks for acute herpes zoster. Adenosine monophosphate moderately reduced the pain soon after the start of treatment, decreased desquamation time, and promoted faster healing of the skin than placebo treatment. Adenosine monophosphate treatment reduced virus shedding and cleared the virus faster than in placebo-treated subjects. At the end of the initial four-week treatment period, 88% of AMP-treated patients were pain free, as opposed to only 43% in the placebo group. After four weeks, all patients who had not recovered from pain started receiving AMP treatment without breaking the code. All these patients recovered from pain within three weeks after initiation of treatment. No recurrence of pain or lesions was experienced from three to 18 months after the end of treatment. Adenosine monophosphate, a natural cellular metabolite, showed no side effects or toxicity during and after the treatment."

The eye provides an excellent model to illustrate the impact of one discipline on another. Cardiologists are well aware of the potential of some nutritional supplements in the management of vascular disorders. Vascular alteration to the eye results in a number of disorders including glaucoma and macular degeneration. Why then would an eye care professional not want to realize the ongoing thought process in cardiology. Dermatology realizes that Coenzyme Q10 (CoQ10) levels reflect the likelihood for the progression of malignant melanoma, one of the more dreaded ocular conditions. Of particular interest is the behavior of our society in the creation of nutritional deficiencies. Poverty, drug side effects, drug abuse, alcoholism, gastric bypass (bariatric surgery), fad diets, and just ignorance may be opening a door to the genesis of an entirely new set of nutritionally-based diseases and disorders. A question that we all must ask in relation to the work-up of any ocular disease patient must include nutritionally-related issues. The decreased survival of AREDS participants with Age-Related Macular Degeneration (AMD) and cataracts suggests that these conditions may reflect systemic rather than only local processes. Vitamin A deficiency at the least may become an issue associated with fat mal-absorption associated with bariatric surgery which will then impact directly on the genesis of dysfunctional tear syndrome. Vitamin B12 and folate deficiency is also related to mal-absorption and is well known to create ocular side effects with a strong relationship to hyperhomocysteinemia which represents a major cardiovascular threat. In spite of a purportedly healthy diet in the US 10%-14% of Americans...
have a vitamin C deficiency, \(^6\) and up to 15% of adults over 60 years of age have laboratory evidence of B12 deficiency.\(^6\) Treatment of the majority of patients with these readily obtainable nutrients involves basic diet good sense or supplementation as well as exercise and general modification of behavior including cessation of smoking and minimizing the use of alcohol. It continues to amaze that patients believe in the magic bullet. A recent study points out that despite eating a diet rich in omega-3 fatty acids, Alaskan Eskimo patients are developing subclinical atherosclerosis at an early age, likely due in large part to heavy smoking.\(^11\) The thrust of the message in this discussion is that synergism is key rather than an isolated monotherapy approach in the management of most chronic, neurodegenerative, and inflammatory disorders. Modulation (balance) is the critical watchword in the approach to the management of health in most individuals while minimizing risk. Radical behavior or unbalanced therapy can and will create far more harm than good. Exercise potentiates effects and combinant therapies represent the theme of recent “eurekas.” Regular exercise and consuming long-chain n-3 fatty acids (FAs) from fish or fish oil can independently improve cardiovascular and metabolic health, but combining these lifestyle modifications may be more effective than either treatment alone. (Am J Clin Nutr 2007;85:1267) There is no magic pill, but rather a mental set and lifestyle that set the tone for maximizing health. While we should expect everyone to modulate their behavior to maximize their health it just will not happen so we must arm ourselves to become “personal health advisors” to our patients. A recent review study corroborates this stating that healthy lifestyle habits include not smoking, maintenance of optimal BMI, moderate alcohol consumption, and daily exercise. In men and women, maintenance of healthy lifestyle habits is associated with an 80% reduction in the risk for stroke.\(^1\)

Another critical issue regarding supplementation is that the health care provider is often unaware of the patient’s use of non-pharmaceutical products. Vitamin E and Gingko biloba may not be reported in patients using blood thinners. Prothrombin times (PT) will definitely be affected by the utilization of many supplements leading to the possibility of increased bleedability. In a survey conducted in 1999, about 49% of adult Americans were estimated to have used herbal products during the previous year. It has been documented that as many as 31% of the patients who use herbal supplements do so in conjunction with prescribed drugs and about 70% of these patients do not regularly report the use of these products to their health care providers.\(^12\)-\(^13\)

Another enlightening report speaks to the use of complementary medicine use in cancer survivors. It is reported that prayer and spiritual practice were the most prevalent methods, reported by 61.4% of survivors. This was followed by relaxation (44.3%), faith and spiritual healing (42.4%), nutritional supplements and vitamins (40.1%), meditation (15%), religious counseling (11.3%), massage (11.2%), and support groups (9.7%). Hypnosis was least likely to be used (0.4%), and biofeedback therapy (1.0%) and acupuncture/acupressure (1.2%) were used only slightly more often.\(^14\) One critical issue to address is the validity of claims that evolve from scientific studies. This discussion is intended to be scientifically-based to provide the reader with an understanding of the potential of behavioral issues as they relate to the genesis of ocular and systemic disorders. With that in mind be cognizant of the fact that numerous claims by a plethora of studies have yet to be substantiated. The difficulty in developing incontrovertible evidence stems from the complexity of human trials. Extrapolation of some of the concepts of basic research to clinical application is possible, but guarded optimism is the watchword until clinical trials support results. Any analysis of published reports must be tempered by the structure of the study. Peter McDonnell in a recent editorial in Ophthalmology Times February 15, 2006, discusses “Are you skeptical of the latest peer-reviewed results?” Dr. McDonnell cites an article by Ioannidis regarding the fact that Ioannidis reviewed 49 “important” research articles published in top medical journals between 1990 and 2003 and subsequently cited 1000 times. Over 33% of these articles were found to be wrong.\(^15\)-\(^17\) Critical review of new ideas prior to translation of the information to the general health care delivery team is critical in the evolution of any educational model. Increased fraud in publication of trials also seems to be on the increase with printed retractions occurring far after the potential impact of the results\(^18\)-\(^19\) as well as an excess of apparently significant clinical findings.\(^20\) One Canadian study provided an
interesting commentary on industry-sponsored research on prostaglandin medications. They found that industry-funded studies were significantly more likely (19/27 studies = 70%) to have abstract conclusions that did not match the actual reported main outcomes of the study than were non-industry-funded investigations (2/12 = 17%, P = .002). Conclusions of the abstracts in industry-funded studies were supportive of the company’s drug 89% of the time.21

With the caveat of guarded optimism the investigation of the literature regarding cross-talk may be initiated.

Diet That Supports Anti-Inflammation, Neuroprotection and Overall Ocular Health

The eyes are truly the window to both the soul and functioning of the body. All aspects of health are ultimately reflected in the health of the eye but the direct cause-effect relationship is evasive because of the cumulative effect of one’s actions. Diet and diets both affect the health of the eyes. An abusive diet, drug interactions, and toxicities create health issues within the cardiovascular, endocrine and neurological systems that reflect in ocular function. Likewise radical diets and bariatric surgery rob the body of essential nutrients to promote proper function. This discussion will but touch the high points of diet, behavioral modification and supplementation but will speak to the importance of a coordinated effort in preventing and managing systemic and thus ocular disorders.

Excessive weight and obesity in concert with an inappropriate diet loom as a constant threat to both systemic and ocular health.22-23 Morbidity and mortality are both affected by diet with a prudent approach being to maintain your weight at a reasonable level while concurrently consuming health-sustaining nutrients. There are studies linking obesity to macular degeneration.24 In one report overall and abdominal obesity increased the risk for progression to advanced AMD, and more physical activity tended to decrease risk.25-26 Interestingly there is also increased risk should the patient be too thin implying the influence of malnourishment.27 Another recent report suggests that in Latinos cardiovascular risk factors may play a role in advanced AMD.28 This should be of no surprise since Richer’s original work demonstrated that cardiovascular risk factors including serum Fe levels contributed to the progression of AMD.29-30 The other risk factors often associated with heart disease such as smoking and altered blood composition are also modifiable in our patient base.31-33 Reports also attest to the fact that obesity is actually related to a decrease in macular pigment levels that may be attributable to an inherent competition with adipose tissue.34-36 Serum levels of lutein and zeaxanthin are the true measures of efficacy of the protective effects of diet and both levels are measured lower with obesity and diabetes.37 All of these studies still do not absolutely indicate the need for diet control from a scientific standpoint, but studies point to the necessity for cessation of smoking in minimizing the risk for AMD.38

From the standpoint of cataract development there has been much discussion regarding diet. While very specific, some studies show a link of metabolic syndrome with the genesis of cataracts.40-44 It appears that there is a link between oxidative stress and cataract formation with smoking again being implicated.45 In general it also appears that obesity is a positive marker for the increased likelihood of cataract formation but a bit unpredictable based on the type of cataract.46-48 With a higher Body Mass Index (BMI), abdominal obesity, and diabetes, patients develop a higher incidence of cortical and posterior sub-capsular cataracts.49-53

The link to diabetes and obesity (most specifically the metabolic syndrome) is incontrovertible.48-51 Metabolic syndrome denotes a common cluster of naturally connected risk factors including obesity, elevated blood pressure, insulin resistance, dyslipidemia, proinflammatory state and prothrombotic state. This scenario (the metabolic syndrome) has the potential to lead to multiple retinal vascular flow issues within the eye.52 The link to diabetic retinopathy is more circumspect but studies have linked retinal microvasculopathy to metabolic syndrome.49,53 Inhibition of inflammatory mediators is likewise implicated in minimizing diabetes risks54 and can be achieved by dietary modification. A diet designed to address the metabolic syndrome may be the direction to go to minimize the risk of diabetic retinopathy, but clinical trials must corroborate this conclusion. Additionally one must address other situations that may increase oxidative stress and decrease oxygenated blood supply to the eye such as smoking and sleep apnea.
There also exists an association of weight issues to glaucoma. There is certainly a suggestion that there is an association of insulin resistance and the metabolic syndrome to increased intraocular pressure. The Body Mass Index appears to have an association with elevated intraocular pressure. Certainly initial reaction to this fact among clinicians would be to point to neck size and positive pressure as a related factor with sleep apnea falling into the picture. The relationship of cerebrospinal fluid pressure elevation, Idiopathic Intracranial Hypertension, serum cortisol, and sleep apnea also create an interesting scenario for elevated intraocular pressure. While further analysis from a scientific standpoint is critical, it does appear, quite logically, that obesity has a link to glaucoma from no other standpoint than physical restriction of flow.

Cordain contends that our Western diet has evolved in a disparate manner from our basic biological needs. The contention is that we still have cave-man genes (genotype) requiring the Paleolithic diet that are not being properly nourished by our current diet. This aberrant diet then creates an oxidative stress that impacts on the inflammatory reaction as well as the immune system. Oxidative stress in glaucoma leads to alterations in Retinal Ganglion Cells that precipitate damage. Similar results could be expected in other ocular disorders. Without proper conversion of these radicals the stress creates a poison to the system. Phytochemicals such as green or black tea, coffee, dark chocolate, and red wine contain polyphenolic compounds that act as free radical scavengers. A recent paper looking at a subset of black women attests to the fact that consuming three or more servings of fruit each day was associated with a 79% decrease in glaucoma risk compared with eating less than one serving per day. Likewise as one would expect, in another study regarding African American Women, a higher intake of soft drinks and fruit drinks was associated with an increased incidence of Type 2 Diabetes. Balance (MODULATION) is the watchword in any issue of diet, supplementation and behavioral modification.

Additionally a recent study offers the following recommendations for an anti-inflammatory diet to improve the overall health and most specifically the cardiovascular system which has strong implications in all ocular disorders with carry over to neurodegenerative diseases. C-reactive protein levels are a very good indicator of the presence of systemic inflammation and have been shown to be elevated in many ocular disorders. Any disease with elevated C-reactive protein levels will potentially benefit from an anti-inflammatory diet.

“This anti-inflammatory diet should be considered for the primary and secondary prevention of coronary artery disease and diabetes.”

The glycemic index of a food is defined as the incremental increase in the area under the postprandial glucose curve after ingestion of 50 g of a specific amount of food versus that associated with 50 g of oral glucose. Ideal carbohydrates with a low glycemic index include green leafy vegetables such as broccoli and spinach and fruits such as grapefruits and cherries. Select high-fiber carbohydrates with low glycemic index, including vegetables, fruits, whole grains, legumes, and nuts.

Excess intake of processed carbohydrates leads to a vicious cycle of transient spikes in blood glucose levels, increased insulin production, and reactive hypoglycemia. Avoid highly processed foods and beverages, particularly those containing sugar, high-fructose corn syrup, white flour, or trans fats.

Berries, dark chocolate, red wine, tea, and pomegranates reduce postprandial oxidant stress and inflammation. Cacao beans contain a subclass of flavonoids which have been reported to augment eNOS and thereby NO. This improves endothelium-dependent vaso-relaxation.

One study showed that one square of dark chocolate was 6.3 g and represented only 30 kcal per day but previous studies have shown that 100 g of dark chocolate lowers BP by 12/8 mm Hg but with the risk of increased caloric intake.

Coffee contains antioxidants and can improve insulin sensitivity. Consumption of black tea reduces platelet activation and plasma levels of C-reactive protein. However, previous research
has not demonstrated a consistent reduction in the risk for stroke associated with coffee or tea consumption. One study suggests that higher levels of coffee and tea consumption can reduce the risk for cerebral infarction among male smokers but not risk rates of intracranial hemorrhage. 78

■ When paired with a high-glycemic-index meal, cinnamon slows gastric emptying and reduces postprandial glucose excursion.

■ Nuts also slow gastric emptying and can reduce the impact of high-glycemic-index carbohydrates by as much as half. Nuts also reduce postprandial oxidative protein damage, and consumption of nuts at least 5 times weekly can reduced the risks for coronary artery disease and diabetes by 20% to 50%. Eat approximately 1 handful of nuts daily (using a closed fist), consumed with vegetables, grains, berries, or other fruits.

■ Vinegar can reduce postprandial glycemia and promotes satiety. Eat salad daily, consisting of leafy greens with dressing of vinegar and virgin olive oil.

■ Lean protein reduces postprandial glucose excursion and improves satiety. Such protein includes egg whites, game meat, skinless poultry breast meat, and whey protein or other nonfat dairy protein. At all 3 meals, consume lean protein.

■ Drinking 0.5 to 1 alcoholic drink per day for women and 1 to 2 alcoholic drinks per day for men can reduce cardiovascular risk, and 1 to 2 drinks before a meal can reduce postprandial glucose and insulin levels. However, higher levels of drinking can impair glucose metabolism.

■ Exercise acutely lowers glucose and triglyceride levels in a dose-dependent fashion. Perform physical activity for at least 30 minutes or more daily, at least moderate intensity.

■ Maintain normal weight and avoid overweight or obesity. Waist circumference should be less than one half of height in inches.

It has been demonstrated that a low glycemic index diet is beneficial for both weight loss and lipid profiles.79 Additionally women in the highest quintile of consumption of a high-fat, low-fiber diet had an increase in the relative risk of developing colon cancer of 1.46 compared with those in the lowest quintile. However, consumption of a high-fiber and healthy protein diet was associated with a trend toward reduced rates of colon cancer. Diet did not significantly affect the risk for rectal cancer.80

In a perfect world where we all ate the Paleolithic diet, exercised, maintained the proper weight and did not consume any substances with potential toxicity, supplementation would be totally unnecessary. However, the world is less than perfect and even the most well-meaning are faced with less than optimal lifestyles, therefore there must be some attention paid to reminders and supplementation. It is also critical that with any of these considerations, potential toxicities and interactions must be addressed.

CHARACTERISTICS OF THE METABOLIC SYNDROME

1. Abdominal obesity
2. Atherogenic dyslipidemia
3. Elevated Blood Pressure
4. High insulin levels—over 10
   a. Raises fats into cells
   b. Promotes fat storage
   c. Stimulates arterial smooth muscle cells
   d. Promotes production of bad types of eicosanoids (EC)—intracellular hormones
   e. Series one ECs are good and may be inhibited by too much flaxseed
   f. Series two ECs are bad—glucagon is a strong inhibitor of EC 2 pathway
5. Promotes retention of fluids by kidneys

Glucagon is the anti-insulin and is increased by high proteins low carbohydrates
6. High levels of inflammatory mediators as measured by C-Reactive Protein levels

Part two of this series will start to address the reported benefits of specific nutrients and supplements.

Dr. Alexander receives no reimbursement from any nutritional supply company. He serves as an advisor on the Biosyntec board for no remuneration. He is the Director of Clinical Education for Optovue, Inc, a digital imaging company, which produces the RTVue.
References:


Are you doing all you can to maximize the revenue potential of your practice?

Optometry News Network
Visit us at: www.clinicalnetworks.ca

ATLANTIC EYE SYMPOSIUM
CATARACT • CORNEA • GLAUCOMA • RETINA
Something for everyone.
SEPTEMBER 18 & 19, 2009 • HALIFAX, NOVA SCOTIA
www.atlanticeye.ca


