

Understanding Medications, Supplements, and Their Impact on Eye Health

2 hours

Frances Bynum, OD

Tonya Reynoldson, OD, MBA

Description

This continuing education course explores the ocular effects of systemic medications and nutritional supplements, including both adverse and therapeutic impacts. Emphasis will be placed on the clinical signs of drug-induced ocular toxicity, optometric management strategies, and the evidence supporting the use of ocular nutritional supplements. Optometrists will gain insights into monitoring protocols and co-management practices with other healthcare providers.

Objectives

- Identify common systemic medications that affect ocular structures and functions
- Recognize the signs and symptoms of ocular side effects associated with medications
- Understand the role of nutritional supplements in maintaining and improving eye health
- Apply evidence-based guidelines in managing patients taking medications or supplements with ocular effects
- Collaborate effectively with other healthcare providers in the co-management of patients experiencing ocular side effects

Course Outline

- I. Introduction of speakers
 - a. Background
 - b. Disclosures
- II. Systemic drugs effects on the eye
 - a. Side effects
 - i. Dry eyes
 - ii. Toxicity
 - iii. Deposits in the cornea and retina
 - b. Antihistamines
 - i. CASE presentation
 1. Use of daily oral antihistamine
 2. Dry eyes
 3. Treatment options
 4. Holistic approach to allergies discussed
 - a. Air purifiers
 - i. Pollen, pet dander
 - b. Wash bedding
 - i. Pollen and dust mites
 - c. Dehumidifiers
 - i. Helps with mold
 - d. Hygiene Habits
 - i. Hand washing

- ii. Remove contacts
 - iii. Change clothes and showering
 - 5. Diet & Nutrition
 - a. Omega 3 fatty acids
 - i. Salmon, flaxseed, walnuts
 - ii. Leafy greens, berries, turmeric, ginger
 - b. Natural antihistamines found in food
 - i. Onions
 - ii. Apples
 - iii. Berries
 - iv. Broccoli
 - v. Honey
 - c. Vitamin C
 - d. Probiotics
- c. Antidepressants
 - i. Most prescribed medications worldwide
 - 1. Statistics
 - ii. Major Classes
 - 1. Serotonin reuptake inhibitors (SSRIs)
 - a. Fluoxetine, sertraline, citalopram
 - b. Ocular effects
 - i. Mydriasis (angle closure)
 - ii. Alter tear film (dry eyes)
 - 2. Serotonin-norepinephrine reuptake inhibitors (SNRIs)
 - a. Venlafaxine, duloxetine
 - b. Mydriasis (pupil dilation)
 - c. Dry eyes altered autonomic control of lacrimal glands
 - 3. Tricyclic antidepressants (TCAs)
 - a. Amitriptyline, nortriptyline
 - b. Blurred vision
 - c. Decreased accommodation
 - d. Dry eye decreased tear production
 - 4. Monoamine oxidase inhibitors (MAOIs)
 - a. Phenelzine, selegiline
 - b. Hypertensive retinopathy
 - iii. Dry Eye Syndrome
 - iv. Glaucoma (angle closure)
 - v. Visual Disturbance
 - vi. Retinal and optic nerve
 - vii. Ocular motilities
- d. Anticholinergics
 - i. Ocular effects
 - 1. Mydriasis (pupil dilation)
 - 2. Loss of accommodation

- 3. Dry eyes
- ii. CASE Presentation
 - 1. Blurred vision
 - 2. Pupil non-reactive
 - 3. ER visit
 - 4. Scopolamine patch
- e. Corticosteroids
 - i. Cataracts
 - 1. CASE Presentation
 - 2. PSC cataract development
 - 3. Cataract surgery
 - a. Accommodative issues in young patients
 - ii. Glaucoma
 - 1. CASE Presentation
 - 2. Development of Glaucoma after nasal sprays
 - a. IOP was always normal
 - b. ONH changes
 - c. Visual Field changes
- f. Hydroxychloroquine
 - i. Maculopathy
 - 1. CASE Presentation
 - 2. OCT images
- g. Hypertensive Drugs
 - i. Beta Blockers
 - 1. propranolol, atenolol, metoprolol
 - 2. lowers IOP
 - ii. Calcium Channel Blockers
 - 1. amlodipine, verapamil, diltiazem
 - iii. ACE inhibitors
 - 1. lisinopril, enalapril
 - iv. ARBs
 - 1. Losartan, valsartan
 - v. Diuretics
 - 1. hydrochlorothiazide, furosemide, spironolactone
 - vi. Alpha-Blockers
 - 1. prazosin, terazosin, tamsulosin “sin drugs”
 - 2. ocular effects
 - a. Intraoperative Floppy Iris Syndrome — during cataract surgery
 - vii. CASE Presentation
 - 1. Glaucoma Suspect
 - 2. Elevated IOP after discontinuing beta blocker
- h. Cardiovascular
 - i. Amiodarone
 - 1. Optic neuropathy

- 2. Vortex keratopathy
 - a. CASE Presentation
 - b. Cannot discontinue drug, must be tapered
 - c. Visual decrease
 - i. Topiramate
 - 1. Angle Closure Glaucoma
 - 2. Inflammation
 - a. CASE Presentation
 - b. Vasculitis and Vitritis
 - c. Discontinuation of drug
 - j. Tamoxifen
 - i. Crystalline Retinopathy
 - k. Cancer biologics
 - i. EGFR inhibitors (solid tumors)
 - 1. Erlotinib, gefitinib
 - 2. Ocular effects
 - a. Dry eyes, blepharitis, conjunctivitis
 - ii. HER2 inhibitors (breast cancer)
 - 1. Trastuzumab, ado-trastuzumab
 - 2. Ocular effects
 - a. Dry eyes, conjunctivitis
 - iii. VEGF inhibitors (colorectal, lung, renal cancer)
 - 1. Bevacizumab, ramucirumab
 - 2. Ocular effects
 - a. Eye irritation, visual disturbances
 - iv. VEGF inhibitors (intravitreal) (AMD, diabetic macular edema)
 - 1. Intraocular inflammation
 - v. Tyrosine kinase inhibitors (CML, thyroid cancer)
 - 1. Imatinib, sunitinib, sorafenib
 - 2. Periorbital edema, dry eyes
 - vi. Immune checkpoint inhibitors (melanoma, NSCLC, RCC)
 - 1. Nivolumab, pembrolizumab
 - 2. Dry eyes, uveitis, conjunctivitis
 - l. GLP-1 (semaglutide, liraglutide)
 - i. Optic neuritis
 - ii. Diabetic retinopathy progression
 - iii. Neurological effects (diplopia)
 - m. Artificial Sweeteners
 - i. aspartame, sucralose, saccharin, stevia, and sugar alcohols
 - ii. Drusen?
- III. Ocular Medications and Ocular supplements
 - a. Studies
 - i. Reading studies
 - 1. What are they studying?

2. What was the cohort
3. Who supported (financed) the study?
- ii. Macular Degeneration
 1. AREDS
 - a. Macular degeneration
 - b. 1992-2001
 - c. high-dose antioxidant combination—including vitamins C (500 mg), E (400 IU), beta-carotene (15 mg), zinc (80 mg), and copper (2 mg)
 - d. Intermediate to advanced AMD
 2. AREDS2
 - a. Macular degeneration
 - b. 2006-2012
 - c. lutein + zeaxanthin (10 mg + 2 mg) or omega-3 (DHA + EPA) would provide additional benefit, as well as variations like removing beta-carotene or reducing zinc
 - d. no Beta Carotene (lung cancer) for smokers
 3. AREDS3??
 - a. Hypothetical next-gen AMD supplement trial, building on AREDS2.
 - b. Meso-zeaxanthin, optimized lutein/zeaxanthin dosing, botanicals, genetics.
 - c. Address absorption/interference, personalize treatment, enhance efficacy.
- iii. CREST
 1. Macular degeneration
 - a. Healthy patients and early AMD patients
 - b. Add meso-zeaxanthin
 - c. Improved macular pigment density
 - d. Improved contrast sensitivity
- iv. Dry Eyes
 1. DREAM
 - a. Dry Eye Assessment
 - b. Omega-3 Fatty Acids vs olive oil placebo
 - c. No significant improvement
 2. Omega-3 Supplement Meta-Analysis
 - a. statistically significant improvements across multiple DED metrics
 - b. OSDI symptom scores, TBUT, Schirmer's test (tear volume), staining, and osmolarity
 3. Multi-Ingredient Supplements
 - a. lutein (20 mg), zeaxanthin isomers (4 mg), curcumin (200 mg), and vitamin D3 (600 IU) (referred as "LCD")
 - b. improvement
 - i. tear production
 - ii. OSDI scores
 - iii. TBUT, tear osmolarity

- iv. Conj/corneal staining and inflammation markers
- c. Add: lutein (6mg) zeaxanthin (1mg) elderberry extract (100mg)

Summary Table

Condition	Supplement(s)	Outcome Summary
AMD (intermediate)	AREDS/AREDS2 (antioxidants, zinc, lutein)	~25% reduction in progression; AREDS2 safer for smokers, slightly more effective
Dry Eye Disease	Omega-3	Mixed results—DREAM: no benefit; meta-analysis: some symptom/sign improvements
Dry Eye Disease	LCD (lutein, zeaxanthin, curcumin, Vit D3)	Marked improvements in symptoms and ocular surface measures (RCT)
Dry Eye Disease	Lutein + Zeaxanthin + Elderberry	Short-term symptom improvement (~52% OSDI reduction) (RCT)
Early AMD	Zinc alone	Slowed visual acuity deterioration (small RCT)
Cataract Prevention	Lutein/Zeaxanthin	Observational evidence positive; no clear RCT evidence
Visual Performance	Meso-Zeaxanthin + Lutein/Zeaxanthin	Improved contrast sensitivity in early AMD/healthy subjects (RCTs)

v. FLIES (Floater Intervention Study)

1. Vitreous
2. double-blind, randomized, placebo-controlled clinical trial
3. Nutrition Research Centre Ireland (NRCI), Waterford Institute of Technology
4. 125mg L-lysine; 40mg Vit C; 26.3mg Vitis vinifera extract; 5mg Zinc; 100mg Citrus aurantium (flavonoids)
5. 61 adult patients
6. Results: ~77% showed decreased vitreous opacity; 9% improvement in contrast sensitivity

IV. Ocular Supplements

a. Lutein and Zeaxanthin

- i. Carotenoids that filter harmful blue light and protect the retina (especially the macula).

b. Vitamin C

- i. Antioxidant that may reduce the risk of cataracts and AMD
- ii. CASE Presentation
 1. PVD in patient
 2. Recommendation of supplements
 3. Follow up

c. Vitamin E

- i. Helps protect eye cells from oxidative damage
- ii. Toxicity

- d. Zinc
 - i. Good or Bad
 - ii. Important for retinal health; helps vitamin A function in the eye
- e. Vitamin A/Beta Carotene
 - i. Night Vision
 - ii. Corneal Health
 - iii. Vitreous Health
 - iv. Avoid smokers
 - v. Night Blindness
 - vi. CASE Presentation
 - 1. 21 yo doesn't eat vegetables
 - 2. Oral Allergy Syndrome (OAS)
 - a. Oral Allergy Syndrome is a **cross-reactivity** between pollen allergens and proteins in certain **raw fruits, vegetables, and nuts**. Your immune system mistakes food proteins for pollen proteins, triggering an allergic reaction.
 - 3. MPOD score
 - a. measurement of the density of macular pigment in the retina
 - b. **Dark leafy greens** (spinach, kale, collard greens)
 - c. **Bright-colored vegetables** (corn, bell peppers, carrots)
 - d. **Egg yolks** (highly bioavailable lutein and zeaxanthin)
 - 4. Treatment recommendations
 - vii. CASE Presentation
 - 1. Poor night vision and contrast sensitivity
 - 2. Athlete
 - 3. Supplements used
 - 4. Discussion of Foods
- f. Omega-3 (EPA and DHA)
 - i. Tear Production
 - ii. Retinal Function
 - iii. CASE Presentation
 - 1. Dry eye patient
 - 2. Autoimmune (RA)
- g. Copper
 - i. Paired with Zinc
- h. Bilberry Extract
 - i. Retinal health
 - ii. Night Vision
- V. Risks of Supplements
 - a. Understanding Drug interactions
 - b. Not Regulated
- VI. Key Takeaways Regarding Supplements
- VII. Questions

