

Course # 149

SECO2026
THE EDUCATION DESTINATION™

Understanding Medications, Supplements, and Their Impact on Eye Health

Frances Bynum, OD
Tonya Reynoldson, OD, MBA

Please Silence All Mobile Devices.

attendseco.com

1

SECO2026
THE EDUCATION DESTINATION™

Frances Bynum, OD

Disclosure statements:
CooperVision: Advisory Board, Speaker's Bureau | IntegraLifesciences: Speaker's Bureau | LKC Technologies: Speaker's Bureau | Macuhealth: Speaker's Bureau

All relevant relationships have been mitigated.

2


SECO2026
THE EDUCATION DESTINATION™

Tonya Reynoldson, OD, MBA

Disclosure statements:
No financial relationships with ineligible companies to disclose.

All relevant relationships have been mitigated.

3




Medications, Supplements and Their Impact on Eye Health

Tonya Reynoldson, OD, MBA
Frances Bynum, OD

COPE: 102167-PM


4



FINANCIAL DISCLOSURES

- > CooperVision, speaker (Bynum)
- > LKC Technologies, consultant (Bynum)
- > Macuhealth, speaker (Bynum)

5



ALL RELEVANT RELATIONSHIPS HAVE BEEN MITIGATED

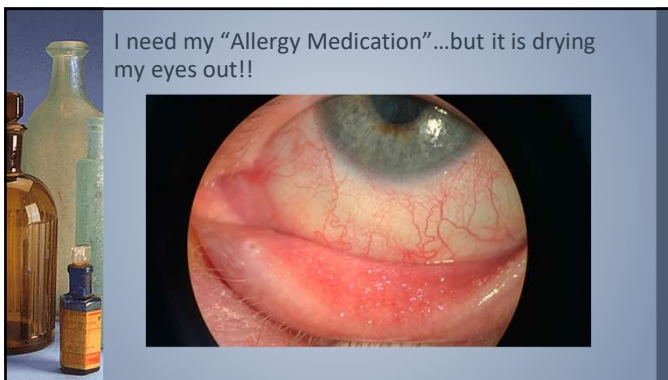
6



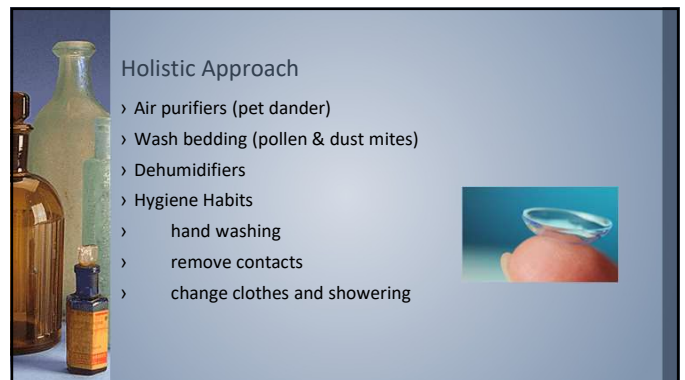
7



8



9



10



11



12


Systemic Medications: Anticholinergics



fineart america

13

Systemic Medications: Anti-depressants



- › Serotonin reuptake inhibitors (SSRIs)
- › Serotonin-norepinephrine reuptake inhibitors (SNRIs)
- › Tricyclic Antidepressants (TCAs)
- › Monoamine oxidase inhibitors (MAOIs)

14

Supplements commonly used for Anti-depression

L-Methylfolate (5-MTHF)
Mechanism: helps produce serotonin, dopamine, norepinephrine

SAMe (S-Adenosyl Methionine)
Mechanism: increases serotonin, dopamine, norepinephrine production

Magnesium Glycinate or Threonate
Mechanism: supports GABA, reduces anxiety, improves sleep, calms the nervous system

15

Supplements commonly used for Anti-depression

Rhodiola rosea
Effects: improves energy, decreases fatigue, mild antidepressant effect

Vitamin D3
Mechanism: regulates serotonin and inflammation; deficiency linked with depression

Omega-3 Fatty Acids (EPA-dominant)
Mechanism: reduces inflammation, supports neurotransmitter signaling

16

Supplements commonly used for Anti-depression

Ashwagandha
Effects: reduces cortisol, improves stress resilience, mild mood benefits

St. John's Wort (*Hypericum perforatum*)
Effects: SNRI/SSRI-like activity; effective for mild-moderate depression

17

Systemic Medications: Corticosteroids



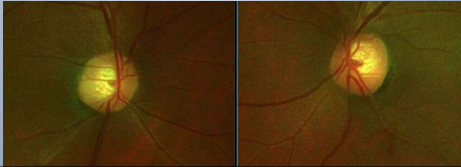
18

Systemic Medications: Corticosteroids
 CASE: Nasal Spray and Glaucoma

Normal IOP

ONH changing??

Visual Field....defect consistent with POAG



19

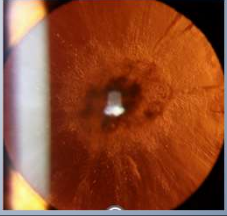
Systemic Medications: Corticosteroids
 CASE: PSC cataract

CC: blurred vision, centrally

MHx: dose paks for chronic sinus issues

Assessment: PSC, bilateral

Plan: cataract sx recommended




20

Supplements commonly used for Anti-inflammation

Closest to steroid-level anti-inflammatory effects:


- Curcumin (Turmeric Extract)
- Boswellia (Frankincense Extract)
- Quercetin
- Omega-3 Fatty Acids (EPA/DHA)



21

Supplements commonly used for Anti-inflammation

- Ashwagandha
- Rhodiola
- Holy Basil (Tulsi)
- Licorice Root (Glycyrrhiza glabra) (adrenal-cortisol extender)
- Bromelain (Pineapple Enzyme)
- CBD (Cannabidiol)
- Resveratrol



22

Systemic Medications: Hydroxychloroquine



23

Systemic Medications: Hydroxychloroquine
 CASE: toxicity

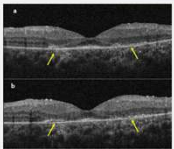




Figure 1: Optical coherence tomography (OCT-SD). Alteration of the internal segments / external segments of photoreceptors line with disappearance of the external retina on either side of the macula (yellow arrows), giving an appearance said in "flying saucer" to the right (a) and left (b) eye.

24




Systemic Medications: Hypertensive Drugs

- > Beta Blockers
- > Calcium Channel Blockers
- > ACE inhibitors
- > ARBs (angiotensin receptor blocker)
- > Diuretics
- > Alpha-Blockers




25




Natural Anti-hypertensives

- Magnesium (Vasodilation)
- Potassium (Electrolyte balance)
- CoQ10 (Endothelial support)
- Omega-3s (Anti-inflammatory)
- Garlic (Natural ACE inhibitor)




26




Natural Anti-hypertensives

- Beetroot (Nitric oxide boost)
- L-arginine/L-citrulline (Nitric oxide)
- Hibiscus (ACE-like)
- Grape seed extract (Antioxidant)
- Taurine (Vasodilation + calming)
- Olive leaf (ACE-like)




27



Systemic Medications: Hypertensive Drugs


- > CASE: elevated IOP after stopping systemic B-blocker
- > IOP: 19-21.....stopped B-blocker....IOP >25mmHG
- > Treat??

28




Systemic Medications: Cardiovascular (Amiodarone)

- Corneal Whorls
- Optic Neuropathy
- Photosensitivity




29




Systemic Medications: Cardiovascular (Amiodarone)

CASE: consider topography

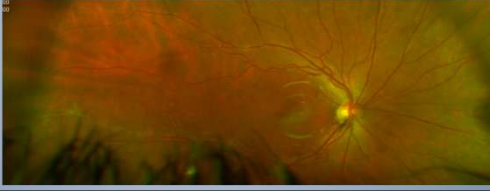


30




Headaches: Systemic Medications: Topiramate

Angle Closure Glaucoma
Vasculitis & Vitritis




31



Headaches


#1 cause of headache?

32




Headaches

#1 cause of headache?



33




Headaches

Magnesium (Glycinate, Malate, or Citrate)
One of the most effective natural headache preventatives.

Hydration + Electrolytes
Dehydration is one of the most common headache triggers.

Caffeine (small amount)
A small amount can *relieve* headaches, especially migraines, by constricting dilated vessels.

34




Headaches

Ginger
Natural anti-inflammatory comparable to pain relievers in some studies.

Peppermint Oil (Topical)
One of the most proven natural remedies for tension headaches.

Melatonin
Helpful for people with migraine or cluster headaches.

35




Systemic Medications: Biologics

EGFR inhibitors (solid tumors)
HER2 inhibitors (Breast Cancer)
VEGF inhibitors (colorectal, lung and renal cancer)
VEGF inhibitors (intravitreal) AMD, diabetic, etc
Tyrosine kinase inhibitors (CML, thyroid cancers)
Immune checkpoint inhibitors (melanoma)

Common ocular side effects:
dry eyes, periorbital edema, conjunctivitis


36



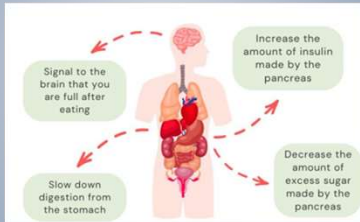
Inflammation Bloodwork

CRP (general body inflammation)
VEGF (vascular endothelial growth factor)
Homocysteine (vascular inflammation)
ESR (settling rate of red blood cells)


37



Systemic Medications: GLP-1




38




Systemic Medications: GLP-1

Common FDA-approved GLP-1 receptor agonists

Semaglutide	Tirzepatide	Liraglutide	Dulaglutide
Ozempic® FDA: Type 2 diabetes (Once weekly)	Mounjaro® FDA: Type 2 diabetes, obesity (Once weekly)	Saxenda® FDA: Obesity (Once daily)	Trulicity® FDA: Type 2 diabetes (Once weekly)
Wegovy® FDA: Obesity (Once weekly)	Zenpeff® FDA: Obesity (Once weekly)	Victoza® FDA: Type 2 diabetes (Once daily)	
Rybelsus FDA: Type 2 diabetes (Once daily)			

39




Supplements like GLP-1

Berberine- “nature’s metformin”
The closest natural compound to GLP-1 activity

Inositol (Myo-inositol or D-chiro inositol)
Especially helpful in insulin resistance, PCOS, and metabolic syndrome.

Chromium Picolinate
Improves glucose uptake

40




Supplements like GLP-1

Alpha-Lipoic Acid (ALA)
improves insulin sensitivity

Green Tea Extract (EGCG)

Bitter Melon
Increases GLP-1 secretion
Acts like insulin in peripheral tissues
Reduces post-meal glucose

41



Supplements like GLP-1

Cinnamon Extract (Cinnamaldehyde)
Slows gastric emptying
Increases insulin sensitivity
Reduces appetite swings

Apple Cider Vinegar
Slows sugar absorption
Improves Insulin Sensitivity

42



43

FDA-Approved Artificial Sweeteners

ARTIFICIAL SWEETENER	BRAND NAME	SWEETNESS COMPARED TO SUGAR
Aspartame	Equal®, NutraSweet®, others	180 times sweeter than sugar
Acesulfame-K	Sunett®, Sweet One®	200 times sweeter than sugar
Saccharin	Sweet 'N Low®, Necta Sweet®, others	300 times sweeter than sugar
Sucralose	Splenda®	600 times sweeter than sugar
Neotame	No brand names	7,000 to 13,000 times sweeter than sugar
Advantame	No brand names	20,000 times sweeter than sugar

44

Natural Sweeteners

- Stevia**
Zero
Sweet w/ possible aftertaste
Drinks, baking
- Monk fruit**
Zero
Clean, sweet
Baking, coffee
- Allulose**
Zero
Closest to sugar
Baking, caramelizing

45

Natural Sweeteners

- Erythritol**
Zero
Sugar-like
Baking
- Xylitol**
Low
Sugar-like
Gum, dental benefits
- Honey**
Moderate
Floral, rich
Tea, glaze

46

Natural Sweeteners


- Maple syrup**
Moderate
Caramel-like
Baking
- Coconut sugar**
Moderate
Brown sugar flavor
Baking
- Dates**
Moderate
Sweet + fiber
Energy balls, baking

47

Sugar & Eye Disease

Simple sugars can be harmful because they result in the production of advanced glycation end products (AGEs), which promote inflammation. Intake of simple sugars has been linked not only to AMD, but also to other diseases promoted by inflammation, including cancer, heart disease, and arthritis.

48




Sugar Consumption

Recommended Intake

American Heart Association (AHA) recommendations:

- **Women:** ≤ 6 teaspoons/day
- **Men:** ≤ 9 teaspoons/day

49



Sugar Consumption


Reality

≈ 25 teaspoons/day
(One of the highest globally)

This includes:

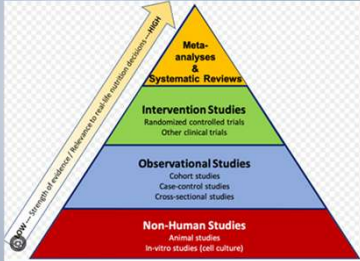
- Sugary drinks
- Desserts
- Packaged foods
- Hidden sugars in sauces, breads, snacks
- That equals ~57 pounds of added sugar per year

50




Ocular Medications & Ocular Supplements

- › AREDS
- › AREDS2
- › AREDS3
- › CREST
- › DREAM
- › FLIES



The pyramid diagram shows levels of evidence from bottom to top: Non-Human Studies (Animal studies, In-vitro studies (cell culture)), Observational Studies (Cohort studies, Case-control studies, Cross-sectional studies), Intervention Studies (Randomized controlled trials, Other clinical trials), Systematic Reviews, and Meta-analyses. An arrow on the left points upwards, labeled 'Strength of Evidence ↑ Intervention for real life population ↓ Risk ↓ Cost ↓ Time ↓'.


51



AREDS: Age-Related Eye Disease Study

- › High-dose antioxidant combination: Vit C (500mg), E (400 IU), beta-carotene (15mg), zinc (80mg), and copper (2mg)
- › AREDS 2: lutein + zeaxanthin (10mg + 2mg); Vit C (500mg), E (400 IU), zinc (80mg), and copper (2mg)
 - Beta-carotene, which was in the original AREDS formula, was removed in AREDS2 because of safety concerns (particularly an increased lung cancer risk for current or former smokers)
 - Both 25 mg and 80 mg zinc AREDS2 formulas are considered reasonable
 - No benefits to no AMD or early AMD Groups.....


52



CREST study:
Central Retinal Enrichment Supplementation Trial

- › CREST looked at whether **macular pigment carotenoids** could:
 - Increase **macular pigment optical density (MPOD)**
 - Improve **visual function** (contrast sensitivity, glare recovery)
 - Potentially slow functional decline in **non-advanced AMD**
- › This is very different from AREDS, which focused on **progression to advanced AMD**.
- › CREST focused on the three macular carotenoids:
 - › Lutein
 - › Zeaxanthin
 - › Meso-zeaxanthin ← important distinction


53



DREAM study:
Dry Eye Assessment & Management Study

- › Do omega-3 (fish oil) supplements improve dry eye disease?
- › **Omega-3 group:**
 - 3,000 mg per day of fish oil
- › **Placebo group:**
 - Olive oil capsules
- › They were followed for **12 months**.
- › But what about triglyceride vs ethyl ester form?


54



Omega 3 Fatty Acids

- **Role:** Supports the health of the retina and may reduce the risk of dry eye syndrome and macular degeneration.
- **Sources:** Fatty fish (salmon, mackerel, sardines), flaxseeds, and walnuts.
- **Supplementation:** Fish oil or algal oil supplements
- **Adverse effects in large doses:** increase bleeding time, diarrhea, headaches


55



Lutein & Zeaxanthin

- **Role:** Antioxidants that help protect the eyes from harmful blue light and oxidative stress. They are concentrated in the macula and lens.
- **Sources:** Leafy greens (spinach, kale), corn, eggs, and orange peppers.
- **Supplementation:** Often found in combination supplements for eye health.
- **Recommended levels:** Lutein 10mg/day and Zeaxanthin 2mg/day
- **Side effects:** orangish skin


56



Test covered for AMD (ICD 10 H35.31XX)

- ✓ **hs-CRP**
Justified for systemic inflammation, cardiovascular risk, and chronic disease.
- ✓ **ESR**
Approved for systemic inflammation; inexpensive, widely covered.
- ✓ **Vitamin D (25-OH)**
Often covered, especially with any inflammatory or metabolic diagnosis.


57



Test covered for AMD (ICD 10 H35.31XX)

- ✓ **Fasting glucose, A1C, insulin**
Covered for metabolic monitoring, diabetes screening, and obesity-related diagnoses.
- ✓ **Lipid panel, ApoB**
Covered for cardiovascular prevention and risk assessment.


58



Test covered for AMD (ICD 10 H35.31XX)

- ✓ **Omega-3 Index**
Sometimes covered — many insurers treat as preventive; some treat as “advanced lipid testing” and deny unless high-risk cardiovascular diagnosis is used.
- ✓ **Cystatin C**
Covered for evaluating kidney function or cardiovascular risk.


59



Vitamin A

- **Role:** Essential for maintaining good vision, particularly night vision, and the health of the cornea.
- **Sources:** Carrots, sweet potatoes, spinach, kale, and liver.
- **Supplementation:** Beta-carotene is often included in supplements as a precursor to vitamin A.
- **Toxicity effects:** over 4000mcg - can cause bowel irritability, diarrhea, alopecia, dry eyes


60



Vitamin A

- **CASE: 21 yo that doesn't eat vegetables**
- **Oral Allergy syndrome**


61



Zinc

- **Role:** Important for the production of melanin, a pigment that protects the eyes. Zinc also supports night vision and may slow macular degeneration progression.
- **Sources:** Oysters, beef, nuts, and seeds.
- **Supplementation:** Often paired with antioxidants in supplements for eye health.
- **Adverse effects:** Intakes of 150-450 mg a day affects low copper status, altered iron function and reduced immune function.


62



FLIES study:
Floater Intervention Study

- › A **nutritional supplement blend** containing ingredients such as
 - l-lysine
 - vitamin C
 - Vitis vinifera (grape extract)
 - zinc
 - Citrus aurantium extract
- › 77% saw a reduction of floater bother & 67% better vision


63



CASE: PVD

- › A **nutritional supplement blend** containing ingredients such


64



Vitamin C

- **Role:** A powerful antioxidant that helps protect the eyes from oxidative stress and supports the health of blood vessels in the eyes.
- **Sources:** Citrus fruits, strawberries, bell peppers, and broccoli.
- **Supplementation:** Common in multivitamins or as a standalone supplement.
- **Dosage:** upper limit for adults 2000mg
- **Side effects:** diarrhea, fatigue, sleepiness, heartburn


65



Vitamin E

- **Role:** Helps protect cells in the eyes from free radical damage and may reduce the risk of cataracts and macular degeneration.
- **Sources:** Nuts, seeds, spinach, and fortified cereals.
- **Supplementation:** Often combined with other antioxidants in eye health formulas.
- **Adverse effects:** increase bleeding, nausea, fatigue, muscle weakness, diarrhea


66



Vitamin B (B6, B9, B12)

- **Role:** May reduce homocysteine levels, a risk factor for macular degeneration.
- **Sources:** Meat, fish, eggs, dairy, leafy greens, and fortified cereals.
- **Supplementation:** Common in B-complex vitamins
- **Adverse effects:** High blood sugar levels, nausea, vomiting, blurry vision, headaches


67



Ginseng & The Eye

- **AMD-** Increased removal of protein and lipid deposit from human BM
- **Cataract-** Decrease in the incidence and progression of cataract in a rat model
- **Glaucoma-** Reduce IOP, increased thickness of retina, and lower oxidative stress in a rabbit model
- **DR-** Inhibition of VEGF release from ARPE-19 cell and Reduction in retinal edema in human retina microvascular endothelial cell


68



Astaxanthin

- **Role:** A potent antioxidant that can help reduce eye fatigue and protect the eyes from oxidative stress.
- **Sources:** Found naturally in algae, salmon, and shrimp.
- **Supplementation:** Often included in advanced eye health supplements.
- Be careful taking this with ginkgo, blood thinners, and drugs that reduce sugar.


69



Selenium

- **Role:** Works synergistically with antioxidants like vitamin E to protect eye tissues from oxidative damage.
- **Sources:** Brazil nuts(no more 3-4/day), seafood, and whole grains.
- **Supplementation:** Found in multivitamins or standalone mineral supplements.
- **Adverse effects:** fingernail loss, weight loss, fatigue
- *If you have had skin cancer or an underactive thyroid you should not take.


70



Alpha-Lipoic Acid

- **Role:** An antioxidant that helps regenerate other antioxidants like vitamins C and E, providing additional protection to the eyes.
- **Sources:** Red meat, organ meats, and spinach.
- **Supplementation:** Available in capsule form
- **Adverse effects:** very little, possible nausea
- **Dosage:** 2400mg or less are safe


71



Forms of Magnesium

Glycinate	Anxiety, sleep, cramps
Citrate	Constipation, regularity
Threonate	Brain & cognition
Malate	Fatigue, fibromyalgia
Taurate	Blood pressure, heart health
Orotate	Cardiac support


72



Forms of Magnesium

Sulfate (Epsom) topical	Muscle aches, relaxation
Chloride	Sensitive stomach, topical
Oxide	Constipation only
Hydroxide	Constipation
Gluconate	General supplementation
Aspartate	Raising magnesium (caution)

73




Risks of Supplements

- **Understanding Drug Interactions**
- **Not Regulated**

74

QUESTIONS?

tonyareynoldson@gmail.com
francesbynumod@gmail.com
www.ruralhealthcareeducation.com



75