Controversies in Nutrition

Benefits and Side Effects of Nutraceuticals in Eye Care

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Goal for This Course

- To provide clinically relevant information about general and ocular nutrition.
- Foods, vitamins, herbs, supplements.

Learning Objectives

- Define the term "nutraceutical"
- Identify nutraceuticals commonly used in eye care
- Identify common side effects associated with various nutraceutical products
- Discuss the basic elements of a healthy diet
- Identify foods that provide important health benefits
- Discuss the importance of certain vitamins and other nutrients in both ocular and systemic health

Controversy: which is better?

A healthy diet
or
A fist full of vitamins?

The Human Body and Its Food

- Nutrients - Components of food required for the body’s functioning.
  - Roles:
    - Provide energy
    - Serve as building material
    - Maintenance and repair of tissues
    - Support overall growth and development

Food

Optimal nutrition always starts with food.
A Lifetime of Nourishment

- The nutrients in food support growth, maintenance, and repair of the body.
- Deficiencies, excesses, and imbalances of nutrients bring on diseases of malnutrition.

When you choose foods with nutrition in mind, you can enhance your own well-being.

Eat

Diets that “starve” are seldom sustainable.

Meet the Nutrients

- Essential nutrients – must be obtained in the diet because the body does not make them
- Found in all 6 classes

<table>
<thead>
<tr>
<th>Nutrient Class</th>
<th>Essential Nutrient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrate</td>
<td>Glucose</td>
</tr>
<tr>
<td></td>
<td>Linoleic acid</td>
</tr>
<tr>
<td></td>
<td>Linolenic acid</td>
</tr>
<tr>
<td>Fat</td>
<td>9 amino acids (of 20)</td>
</tr>
<tr>
<td></td>
<td>All 13</td>
</tr>
<tr>
<td></td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

Not too much.

Portion size

The Abundance of Foods From Which to Choose

The Challenge of Choosing the Right Foods
Mostly plants.

A plant-intensive diet provides most essential nutrients.

Can I Live On Just Supplements?

- Food is better than supplements
  - The digestive system can break down and absorb nutrients most efficiently from whole foods
  - Eating provides physical, psychological, and social comfort for people as well

Elements of a Healthy Diet - ABCMV

- Adequacy - get enough of the essential nutrients.
- Balance - contains a good proportion of nutrients from varied food groups.
- Calorie control - choose foods to maintain ideal body weight.
- Moderation - eat any food in reasonable portions.
- Variety - eat different types of food to prevent boredom.

Cultural and Social Meanings Attached to Foods

- Omnivore
  - A person who eats food of both plant and animal origin, including animal flesh
- Vegetarian
  - Lacto-ovo – animal products but no flesh
  - Vegan – neither animal products nor flesh

Nutraceuticals

What are Nutraceuticals?

- The term “Nutraceutical” was coined from “Nutrition” & “Pharmaceutical” in 1989 by Stephen DeFelice MD

“Food, or parts of food, that provide medical or health benefits, including the prevention and treatment of disease.”

Stephen DeFelice, MD in 1989
Nutraceuticals

• Dietary Supplements
• Functional Foods
• Medicinal Foods

Nutraceuticals

• Provide medical or health benefits including the prevention and/or treatment of a disease
• Provide health benefits beyond basic nutrition

***No regulatory definition

Growing Need for Awareness of Nutraceutical Product Use

• The most lucrative form of traditional medicine, generating billions of dollars in revenue
• The nutraceutical industry in the US is about $86 Billion.

Nutraceuticals

***More than 40% of Americans use alternative medical Therapies***

***Nutraceuticals account for a Significant proportion

Examples of Nutraceuticals

• Dietary Supplements:
  • Vitamins, Minerals, Herbs, Antioxidants, Fatty acids, Probiotics, other Botanicals, and Amino Acids
  • Dietary Supplement Health and Education Act (DSHEA, 1994)

Functional Foods

• Modified food that claims to improve health by providing benefit beyond that of the traditional nutrients it contains
Medicinal Foods

- Formulated to be consumed or administered under the supervision of a physician
- Intended for the specific dietary management of a disease or condition for which distinctive nutritional requirements exist
- Based on recognized scientific principles

Nutritional Genomics

- Integration of nutrition, genomic science, and molecular biology.
- Looks at how nutrients affect the activities of genes and how genes affect the activities of nutrients.
- Expected to advance prevention and treatment of certain diseases.

Controversies: Safety and Efficacy

Nutraceuticals

- Safety
- Efficacy
- Scientific Evidence
- Nutritional Supplements
- Pharmaceuticals

An Issue of Purity

Regulation of Vitamins, Herbs, and Supplements

Issue of Safety and Efficacy

- A dietary supplement manufacturer does not have to prove a product’s safety and effectiveness to bring it to market.
- Consumers may be misled by vendors’ claims that herbal and other products treat, prevent, diagnose, or cure specific diseases, despite regulations prohibiting such statements.

Safety and Efficacy

- Patients believe that natural medicines are safe or carry no risk for harm
- Can cause harmful, adverse reactions if quality is poor, taken inappropriately or in conjunction with other medicines
Issue of Safety and Efficacy

Nutraceuticals and Evidence-based Medicine

- Natural Standard
  - Evidence-based, consensus-based, and peer-reviewed, multidisciplinary collective expertise.
  - Natural Medicines

Natural Medicines

- Search objective product information
- Natural Product Effectiveness Checker
  - natural products used for various medical conditions (Effectiveness Ratings)
- Natural Product/Drug Interaction Checker: potential interactions between any natural product & any drug
  - Automatically checks for interactions with EACH INGREDIENT of each product
- Disease/Medical Conditions Search: lists medical conditions & identifies which natural products might be effective.

Regulation of Herbal Products

- Not the same as those for prescription (Rx) or over-the-counter (OTC) drugs
- Once a dietary supplement is on the market, the FDA monitors product information, such as label claims and package inserts
- The Federal Trade Commission (FTC) is responsible for regulating product advertising; it requires that all information be truthful and not misleading

Good Manufacturing Practices (GMP)

- FDA issued Good Manufacturing Practices (GMPs) for Dietary Supplements (2007)
  - Requirements and expectations for manufacture, preparation & storage to ensure quality
  - Guarantee of identity, purity, strength, & composition
  - Large companies comply beginning in 2007; smaller companies by June 2010

Nutrient Content Definitions

- Health
  - Approved claims of relationships btwn. nutrient & disease/condition, provided certain other components to the claim are included
  - Example: A diet with calcium helps maintain bone

- Nutrient Content
  - Descriptions of relative amounts of a nutrient in a product as per FDA regulations
  - Example: Low in sodium

- Structure or Function
  - Role of nutrient intended to affect the structure or function in humans; characterizes the documented mechanism of action to maintain such structure; statements are not disease claims
  - Example: Saw palmetto supports prostate function

Adapted from Table 1: JAMA Sept 17, 2003;290(11):1505-1509
**USP Verified Pharmaceutical Ingredients**

- Pharmaceutical product manufacturers who buy ingredients verified by USP have the assurance that the ingredients
  - are consistent in quality from batch to batch
  - meet label or certificate of analysis claims for identification, strength, purity, and quality
  - are manufactured in accordance with the internationally accepted Good Manufacturing Practices for Drug Substances and Excipients
  - meet requirements for acceptable limits of contamination

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**Reporting Adverse Events from Herbals**

- FDA Website

- Physicians should be vigilant in monitoring for potential adverse events from dietary supplements

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**Organizations with Oversight**

- National Institutes of Health
  - Office of Dietary Supplements (ODS)
  - National Center for Complimentary and Alternative Medicine (NCCAM)
  - National Eye Institute (NEI)

- World Health Organization (WHO)
  - National Registry of Drug-Induced Ocular Side Effects

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**World Health Organization (WHO)**

- Promotes the use of traditional medicine for health care
  - Supports integration of traditional medicine into national health systems with policy & regulation for products, practices & providers to ensure safety and quality
  - Ensures use of safe, effective & quality products based on available evidence
  - Acknowledges traditional medicine as part of primary health care
  - Ensures patient safety by upgrading the skills & knowledge of traditional medicine providers

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**U.S. Pharmacopeia (USP) Labeling**

- "This statement has not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease."

- USP Verified Dietary Supplement Verification Program (DSVP)
  - Voluntary program similar to their mandatory pharmaceutical verification program
  - The most rigorous program currently available for evaluating supplement quality
National Registry of Drug-Induced Ocular Side Effects

- International data on adverse ocular events associated with drugs, chemicals and herbals
- Registry collects case reports of drug-induced ocular side effects
- Collects spontaneous reports from clinicians & accumulates data from spontaneous reports by
  - WHO & FDA
  - Pharmaceutical companies
  - Biomedical literature
- http://www.eyedrugregistry.com

Ginkgo Biloba

- Most popular herbal supplement
  - Highest selling
- Contain flavonoids and terpenoids
  - Potent antioxidant properties
  - Blood thinning properties

Use of Ginkgo Biloba

- Ocular:
  - AMD
  - Glaucoma
- Systemic
  - Memory loss/difficulty concentrating
  - Poor blood flow in the body
    - Claudication
    - Raynaud’s syndrome

Ginkgo Biloba

- Perceived mechanism of action: ↑ Ocular blood flow & antioxidant activity
- Dose: 80 mg twice daily
- Avoid concurrent use with therapy due to risk of ↑ bleeding
  - Coumadin
  - Heparin
  - Plavix
  - Aspirin

Ocular Side-Effects of Ginkgo

- Spontaneous hyphema
- Subconjunctival hemorrhage
- Retinal hemorrhage
- Vitreous hemorrhage

Nutraceuticals in Eye Care
Age-Related Macular Degeneration (AMD)

- AMD results from photo-oxidative retinal injury
  - Leads to inflammation
  - Influenced by genetics
- Antioxidants may slow the damage

Recommendation Chart for Natural Medicines Used for Age-Related Macular Degeneration Prevention

<table>
<thead>
<tr>
<th>Effectiveness</th>
<th>Likely Safe</th>
<th>Possibly Safe</th>
<th>Insufficient Evidence</th>
<th>Possibly Unsafe</th>
<th>Likely Unsafe</th>
<th>Unsafe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likely Effective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possibly Effective</td>
<td>Beta-carotene</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lutein</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vitamin C</td>
<td>(often used with other antioxidants)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vitamin E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zinc</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insufficient Evidence</td>
<td>Vitamin A</td>
<td>(often used with other antioxidants)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Astaxanthin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possibly Ineffective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likely Ineffective</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Ineffective</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Daily Dosage in AREDS

Supplements were manufactured to have the following minimum contents:

<table>
<thead>
<tr>
<th>Supplement</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antioxidants</td>
<td></td>
</tr>
<tr>
<td>Beta-carotene</td>
<td>15 mg</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>500 mg</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>400 IU</td>
</tr>
<tr>
<td>Essential Trace Elements</td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td>2 mg</td>
</tr>
<tr>
<td>Zinc</td>
<td>80 mg</td>
</tr>
</tbody>
</table>

AREDS Rationale: Beta-Carotene

- Why is it important?
- What dose was studied?
- Where can I get it in my diet?

AREDS 1 and 2
**Beta-Carotene**
- AMD
- Contraindicated in smokers - increase risk of lung cancer
  - High dosage
  - Theory - Reduced tumor suppressor cells

**Vitamin E**
- Fat-soluble vitamin
- Perceived MOA:
  - ↑ blood flow & antioxidant activity

**AREDS Rationale: Vitamin E**
- **Why is it important?**
  - Body unable to synthesize
  - Antioxidant capability
- **What dose was studied?**
  - 400 IU/day (AREDS)
- **Where can I get it in my diet?**
  - Nuts, fortified cereals, sweet potatoes
  - 400 IU vitamin E = 182.6 sweet potatoes

**Vitamin E potential benefits**
- Protection against breast cancer
- BSL modulation
- Inflammation
  - Arthritis
  - COPD
  - Parkinson/Alzheimer's

**Vitamin E Risk**
- Vitamin E and Prostate Cancer
  - Longitudinal study - Placebo, Vitamin E, and Selenium
  - Higher risk of prostate cancer in pts taking Vitamin E and/or Selenium
    - 17% higher
- Vitamin E and Lung Cancer
  - VITAL study - increased risk of lung cancer in patients taking vitamin E

**AREDS Rationale: Vitamin C**
- **Why is it important?**
  - Body unable to synthesize
  - Antioxidant capability
- **What dose was studied?**
  - 500 mg/day (AREDS)
- **Where can I get it in my diet?**
  - Citrus fruits and juices
  - 500 mg vitamin C = 4 cups/32 fl oz of orange juice
**Benefits of Vitamin C**

- **Benefits:**
  - Protective against cataract formation
  - Blood sugar regulation
  - Protective against some cancers
  - Cardioprotective
  - Improves lipid profile

- **Caution:**
  - Rare renal failure in high dosage
  - >2000mg

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**AREDS Rationale: Zinc**

- **Why is it important?**
  - Essential trace element
  - Both an anti-oxidant and pro-oxidant
  - Body unable to synthesize
  - High zinc may cause copper deficiency

- **What dose was studied?**
  - 80 mg/day (AREDS)

- **Where can I get it in my diet?**
  - Red meat, poultry, mixed nuts
  - 80 mg zinc = 55.8 oz of red meat
  - 80 mg zinc = 50.3 oz of nuts

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**AREDS Rationale: Copper**

- **Why is it important?**
  - Essential trace element
  - Both an anti-oxidant and pro-oxidant
  - Body unable to synthesize
  - High zinc may cause copper deficiency

- **What dose was studied?**
  - 2 mg/day (AREDS)

- **Where can I get it in my diet?**
  - Seafood, Liver, Nuts, Legumes
  - 2 mg copper = 1/2 oz of liver
  - 2 mg copper = 5 cups of beans

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**AREDS Grading Scale**

1. No drusen or a few small drusen.
2. Pigment abnormalities or non-extensive small or intermediate drusen.
3. Extensive intermediate drusen or any large drusen or non-central atrophy.
4. Good acuity and no advanced AMD in the study eye. Advanced AMD in the fellow eye (choroidal neovascularization or geographic atrophy).

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"AREDS 1 resulted in a formulation of vitamin C, beta carotene, zinc, and vitamin E that reduced the risk of progression of advanced disease by 25% at 5 years."

Emily Chew, MD, from the National Eye Institute in Bethesda, Maryland,
Retina Quiz

The AREDS 1 study found that in subjects with intermediate AMD, or advanced AMD in one eye (but not the other):

a. Zinc alone lowered risk of advanced AMD by about 25 percent.
b. Lutein alone lowered risk of advanced AMD by about 25 percent.
c. Antioxidants increased risk of advanced AMD by about 25 percent.
d. Antioxidants + zinc lowered risk of advanced AMD by about 25 percent.

AREDS 2

Multi-center, multi-factorial, randomized, control-group trial.

2006-2012

4203 participants aged 50 to 85 with bilateral large drusen or large drusen in 1 eye and advanced AMD in the fellow eye.

AREDS 2: Purpose

- To determine if adding lutein/zeaxanthin, omega-3s, or a combination could improve upon the positive results found in the AREDS 1.
- To evaluate the effect of eliminating beta carotene, lowering zinc, or both.

Lutein/Zeaxanthin and Omega-3 Fatty Acids for Age-Related Macular Degeneration. The Age-Related Eye Disease Study 2 (AREDS2) Controlled Randomized Clinical Trial. AREDS2 Research Group. JAMA, May 5, 2013 Online.

AREDS 1 and 2 Formulations

- Vitamin C: 500 mg*
- Vitamin E: 400 IU*
- Beta-carotene: 15 mg (May be listed on the label as '25,000 IU vitamin A as beta-carotene') (eliminated)
  - Why?
- Zinc oxide: 80 mg (40 mg)
  - Why?
- Copper: 2 mg (needed to prevent Cu deficiency caused by high dosage of zinc)*
- Lutein & Zeaxanthin (10 mg & 2 mg)
- Omega-3 fatty acids (1 gram)

AREDS 2 Design

- 4203 participants were randomized to placebo with no additional supplementation or to 1 of 3 treatment groups:
  - Group 1: tablet w/10 mg L + 2 mg Z
  - Group 2: gel cap w/350 mg DHA + 650 mg EPA
  - Group 3: both the tablet and gel cap

On a daily basis

AREDS 2: Primary Study Outcome

- An additional 25% decrease in the risk of progression to advanced AMD in the three treatment groups over the study subjects taking the original AREDS1 supplement.

Study Subjects: AREDS 1 vs AREDS 2

- All stages of AMD
- Average age = 69
- 67% took Centrum (no L)
- Varied diets
- Varied serum L and Z
- More advanced stage
- average age = 74
- 89% taking Centrum Silver (w/minimal L)
- diet high in carotenoids and vegetables
- higher serum L and Z

These differences could impact the ability to detect a more significant reduction in progression!

AREDS 2 First Results

"In the overall analysis, using 3 treatment groups, we found no significant difference in rates of macular degeneration," Dr. Chew said.

AREDS 2 Sub-group Analysis

- 10% reduction in progression to advanced AMD w/L & Z compared to no L&Z
- 18% reduction in progression in subjects who received L&Z + AREDS 1 supplement (without beta carotene) compared to those who took the original AREDS 1 supplement with beta carotene
- 26% reduction in progression in the participants in the lowest quintile of dietary L&Z intake
AREDs 2 Conclusions:
First, the Bad News

- Overall, the addition of 10 mg L and 2 mg Z, 1g DHA + EPA, or both to the AREDS formulation did not further reduce risk of progression to advanced AMD.

AREDs 2 Conclusions

- Results reaffirm previous epidemiological data that high dietary intakes of L&Z reduce the risk of AMD.
- Results support the safety and treatment benefits of substituting 10 mg L and 2 mg Z for beta carotene in AREDS formulations.

Lutein/Zeaxanthin

- Antioxidant activity
  - Prevent free radical damage in the retina
  - More effective than Beta-carotene
- Filter blue light
  - Most damaging type of light due to its short wavelength
- Selectively binds to tubulin
  - Improves structure integrity
  - Maintains eye health and quality of vision

Dietary Sources of Lutein/ Zeaxanthin

What about omega-3 EFAs?

- Fish oil supplement did not significantly alter the progression of AMD in AREDS 2.
AREDS 2 Limitations

- A greater reduction in AMD progression may have been demonstrated if the subject’s diet had been more representative to that of the general US population.
- Inability to determine if the null findings are attributable to lack of efficacy of the supplements, inadequate dosing, inadequate Tx. duration, or a combination of these.

The Egg

Friend or foe?

Omega-3 EFAs

- Essential Fatty Acids:
  - ALA (Alpha Linolenic Acid)
  - EPA (Eicosapentaenoic Acid)
  - DHA (Docosahexaenoic Acid)

Alpha-lipoic Acid (ALA)

- Antioxidant properties that damage
- Helps in recycling Vit C, Vit E & glutathione back to their oxidative state
- ALA is found in vegetable oils, flaxseed, walnuts, and dark leafy vegetables such as spinach

DHA

- Docosahexanoic Acid (DHA)
  - Long chain Omega-3 polysaturated FA
  - Found in highest concentration in the retina

EPA

- Eicosapentaenoic Acid
- Used in DHA biosynthesis
- Found in the flesh of coldwater fish, including mackerel, herring, tuna, halibut, salmon, cod liver, whale blubber, or seal blubber
Health Benefits of Omega-3 EFAs

- Reduce inflammation
- Lower triglycerides
- Reduce the risk of heart disease
- Lower blood pressure
- Improves cognitive function
- Type 2 diabetes

**FDA considers consuming up to 3g of omega-3 per day**

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**Omega-3 Fatty Acids (DHA/EPA)**

- Benefits of DHA/EPA
  - High intake is associated with a decreased risk of progression from drusen to geographic atrophy
- Low levels of DHA and EPA associated with chronic eye conditions such as:
  - Diabetic retinopathy
  - Age-related macular degeneration (AMD)
  - Retinopathy of prematurity
  - Dry eye disease

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**Potential Side Effects of Omega 3**

- Gastrointestinal
  - Nausea and diarrhea, belching, heartburn and abdominal pain, bloating
- Increase risk of excessive bleeding and hemorrhagic stroke
  - High doses of fish oil
- Increase low-density lipoprotein (LDL) levels
  - Atherosclerosis
  - Increases risk of a heart attack or stroke

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**Controversy: Omega-3 EFA**

Triglyceride or ethyl ester?

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**Fish Oil: TG vs. Ethyl Ester Form**

- Triglycerides: form of omega-3 fatty acids (EPA and DHA) that is absorbed when eating fish
- Ethyl ester forms: industry created ethyl ester
  - Still made from fish oil
  - Cheaper than TG
  - Less stable and efficient, therefore may be less readily absorbed
- Rx Omega-3: Lovaza®
  - Ethyl ester form
**Other Supplements**

- **Red Yeast Rice**
  - Naturally occurring lovastatin
  - Cholesterol lowering properties
  - May cause **conjunctivitis**, rhinitis, sneezing in allergic patients

**Niacin (Vitamin B₃)**

- Hypercholesterolemia (high cholesterol)
  - Lowers triglycerides & low-density lipoproteins (LDLs)
- Ocular Complications:
  - Cystoid macular edema (CME)
    - Detected by OCT
    - No leakage on FA
    - Resolves when Niacin stopped

**Niacin**

- Food sources
  - Meats, Beans, Cereal grains, Fish
- Side Effects:
  - Skin flushing
  - Rash
  - Intestinal/stomach upset
  - Reduce the incidence of cataracts by up to 44%

**Grape Seed Extract (GSE)**

- Grapes contain:
  - Polyphenols: compounds derived from plants that act as **antioxidants**
    - May prevent vision problems
    - Have been shown to protect humans from both heart disease and various cancer.
**Resveratrol**

- Polyphenol found in grape skins
- Red wine has a higher concentration of resveratrol than white or rose
  - It has been shown to fight inflammation, inhibit oxidation of certain cells, and prevent apoptosis, or cell death.
- Red wine also contains flavonoids and other antioxidants

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**Vitamin A**

- Fat soluble vitamin stored in the liver
- Ingested form → retinol
- Retinol-binding protein (RBP)
  - Transports retinol
  - Binds and accumulates in the liver during retinol deficiency
  - Releases retinol into blood stream when enough retinol is accumulated

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**Are you getting enough Vitamin A?**

**A**

**Retinol**

- Extreme deficiency attacks the eye, leading to:
  - Permanent blindness
  - Xerophthalmia
  - Night Blindness
  - Alopecia of eye lashes
- Food Sources: liver, kidney, eggs, dairy, dark green or yellow vegetables, carrots

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**Vitamin A**

- Recommended Daily Allowance (RDA)
  - Adults: 700-900 mcg/day (2300-3000 IU)
  - MAX dose: 3000 mcg/day (10,000 IU)
### St. John’s Wort (Hypericum Perforatum)
- Common medicinal uses include:
  - Depression, anxiety, & sleep disorders
  - Nerve pain
  - Balm for wounds, burns, and insect bites
- Hypercine in high doses is photoactive → may damage lens proteins → photosensitivity &/or may lead to cataracts
- Increased risk if taking 2-4 grams of St. John’s Wort extract (5-10mg hypercine) daily

### Licorice (Glycyrrhiza glabra)
- Uses include: inflammatory eye disorders
  - GI & peptic ulcers; constipation; appendicitis
- Inhibits Cyclo-oxygenase (anti-inflammatory activity & anti-platelet activity)
- Licorice: vision loss a
- Ophthalmic Side Effects:
  - Vision Loss → vasospasms of brain, or optic nerve blood vessels
  - Symptoms similar to that of an ocular migraine
  - Avoid in patients with history of migraines

### Bilberry (Vaccium myrtillus)
- “European Blueberry”
  - Contains anthocyanins
  - Powerful antioxidant
- May improve microcirculation
  - Exert direct effects on the retina → alteration of local enzymatic reactions
- Accelerates rhodopsin regeneration

### Consider the Source
Can I trust the media to deliver accurate nutrition news?
**Consumer Corner: Reading Nutrition News with an Educated Eye**

Referred journals: Review journals examine all available evidence on major topics; research journals report details of the methods, results and conclusions of recently completed trials and studies.

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**Controversy: Sorting the Impostors from the Real Nutrition Experts**

Who speaks on nutrition?

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**Who Are the True Nutrition Experts?**

- **Nutritionist**: someone who engages in the study of nutrition. Some nutritionists are RDs, whereas others are self-described experts whose training is questionable and who are not qualified to give advice. In states with responsible legislation, the term applies only to people who have master of science (MS) or doctor of philosophy (PhD) degrees from properly accredited institutions.

- **Public health nutritionist**: a dietitian or other person with an advanced degree in nutrition who specializes in public health nutrition.

- **Registered dietitian (RD)**: a dietitian who has graduated from a university or college after completing a program of dietetics. The program must be approved or accredited by the American Dietetic Association (ADA). The dietitian must have a bachelor’s degree in dietetics or food science and nutrition. The dietitian must also pass a national examination to become a registered dietitian.

- **Dietetic technician, registered (DTR)**: a technical position that requires a certificate or associate degree in nutrition science or dietetics.

- **Licensure**: the process by which a person’s qualifications are determined and recognized. Licensure is required for all dietitians.

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- **Certification**: the process by which a person’s qualifications are determined and recognized. Certification is required for all dietitians.

**My Pyramid: Steps to a Healthier You**

- **Grains**: the foundation of the pyramid. Grains are a good source of fiber and essential nutrients.

- **Vegetables**: the next tier of the pyramid. Vegetables are a good source of vitamins and minerals.

- **Fruits**: the next tier of the pyramid. Fruits are a good source of vitamins and fiber.

- **Milk**: the next tier of the pyramid. Milk is a good source of calcium and other nutrients.

- **Protein**: the top tier of the pyramid. Protein is a good source of essential amino acids.

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**Nutrition on the Net**

- **PubMed (www.pubmed.org)**: Internet resource

- **Sorting the Impostors from the Real Nutrition Experts**

- **Terms Associated with Nutrition Advice**

- **My Pyramid: Steps to a Healthier You**

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*The content areas of the registration examination for dietitians are food and nutrition, clinical and community nutrition, education and research, food and nutrition systems, and management. New emphasis is placed on genetics, complementary care, and reimbursement.*
Controversy: Are some foods “Superfoods”?

- What do they promise?
- What do they deliver?
Phytochemical Supplements

- Foods deliver 1000’s of phytochemicals in addition to nutrients.
- Supporters of phytochemical supplements say:
  * Evidence is good enough to recommend supplements.
  * People have been eating them forever and so they must be safe to consume as supplements.

The Concept of Functional Foods

- Manufactured functional foods are processed foods that are fortified with nutrients or enhanced with phytochemicals or herbs.
  - E.g. Calcium-fortified orange juice
  - E.g. Margarine blended with a phytosterol that lowers blood cholesterol

The Concept of Functional Foods

Functional foods currently on the market promise to “enhance mood,” “promote relaxation and good karma,” “increase alertness,” and “improve memory,” among other claims.

Summary and Conclusions

Eat

Don’t “starve” or deprive yourself.

Not too much.

Modify your portion size.
Mostly plants. A plant-intensive diet provides most essential nutrients.

Conclusions

- Awareness that nutraceuticals (including vitamins, herbs, and supplements) likely have an important role in preventing and treating eye disorders, if used appropriately and monitored carefully.
- Turn to reputable, evidence-based resources and registered or certified professionals that specialize in natural products, medications and traditional medicine.

Other Controversies

- Should all of us be on a multivitamin?
- Should I have that cup of "Joe"? Nutrition and coffee.
- Why is "fast food" cheaper than fresh?
- Which diet is best for people with diabetes?
- Does a better diet improve visual performance?
- Does supplementation improve visual performance?
- To drink or not to drink?
- Nutritional support for the optic nerve
- Nutritional support for the macula
- Nutritional support for the ocular surface
- Can Your Diet be Tailored or Customized to Your Genetic Signature?
- What Kind of Fats and Oils are Healthiest?

Thank you!

Sherrol
and
Joe