

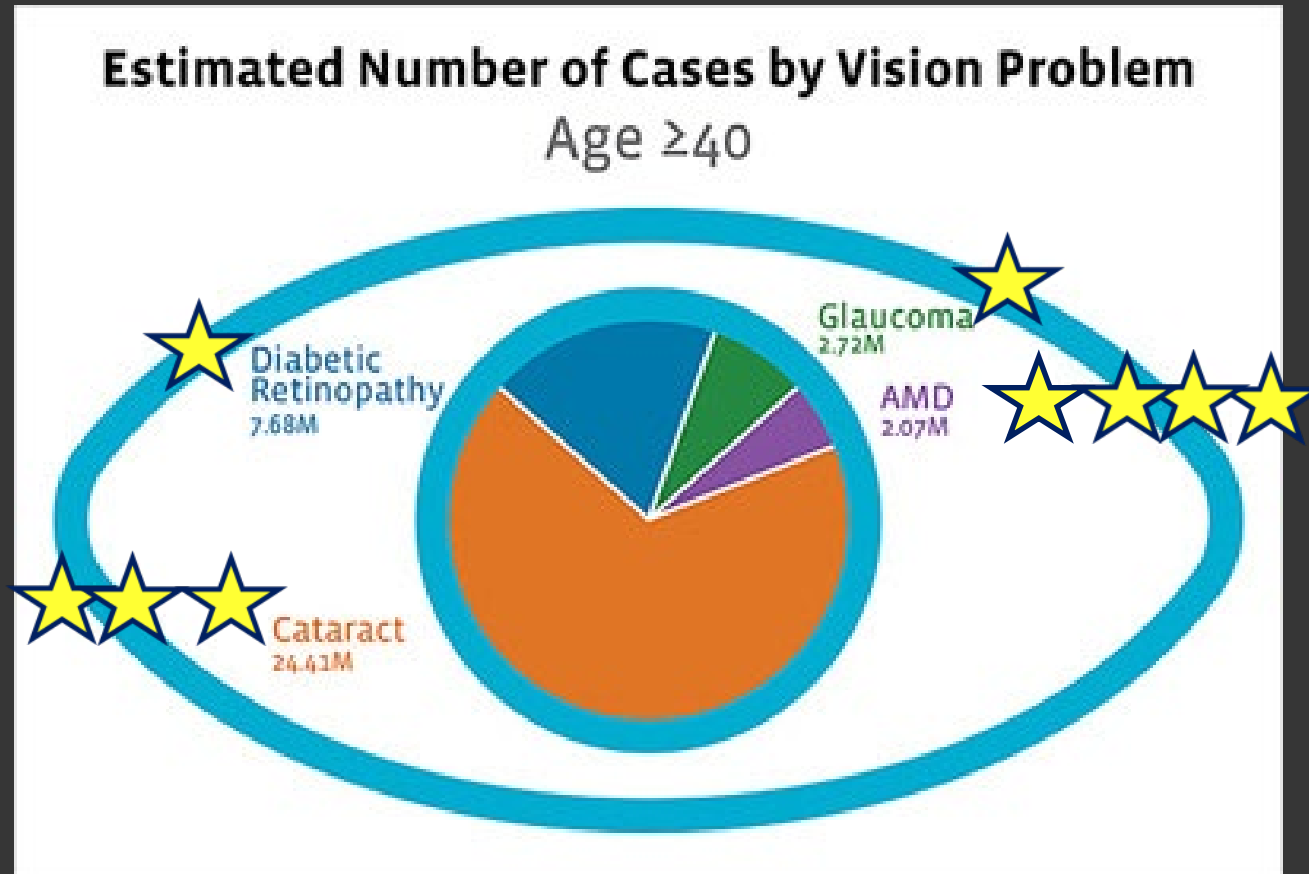


DIETARY PATTERNS AND SUPPLEMENTS TO SLOW AGE-RELATED EYE DISEASE, AND FOSTER EYE HEALTH

Julie Mares, PhD, Professor
University of Wisconsin
Department of Ophthalmology and Visual Sciences

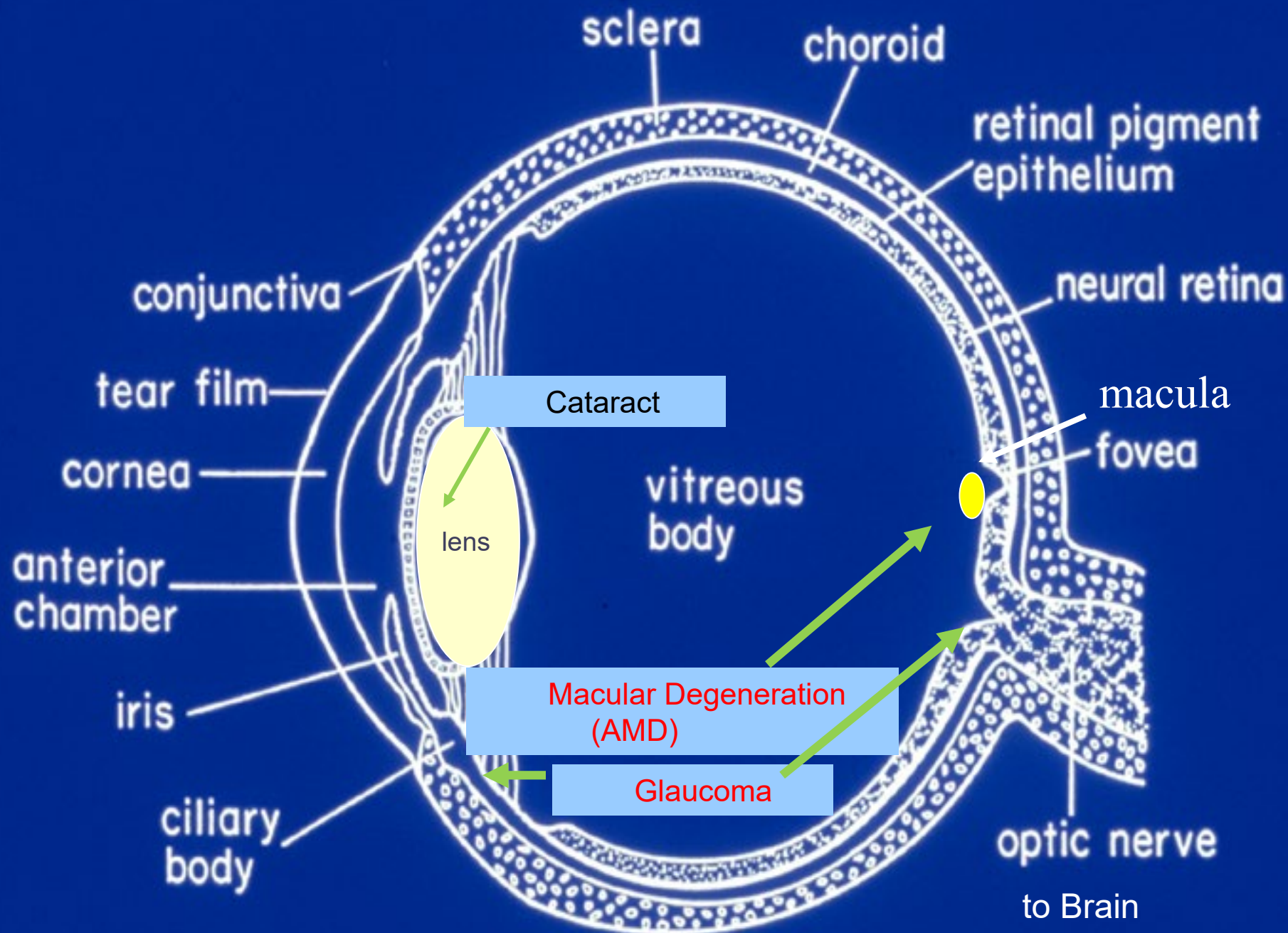
No Conflicts to Report

Good Nutrition is Suspected of Lowering Risk for All Common Causes of Vision Impairment



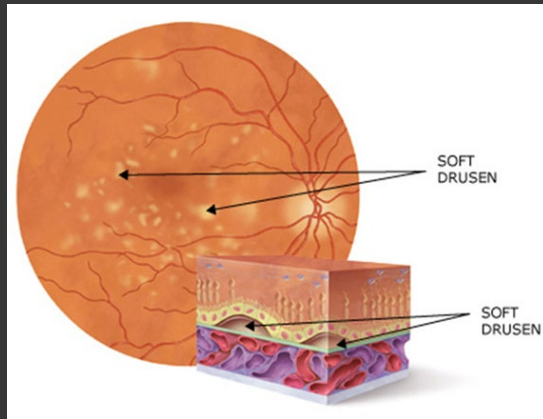
Depth and Breadth of Evidence

nei.nih.gov



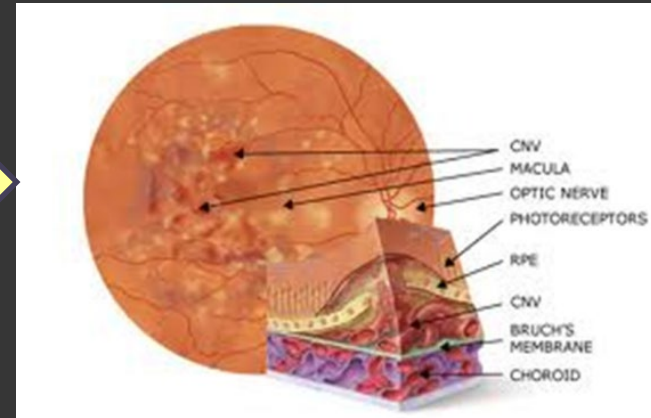
Age-Related Macular Degeneration

Early

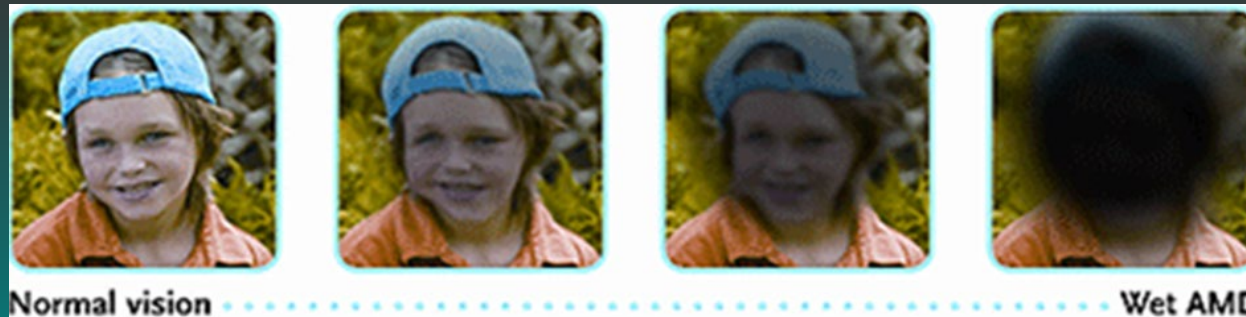


25% > 65 years

Advanced



12% > 80 years



Glaucoma

Several Types

Risk factors for primary type:

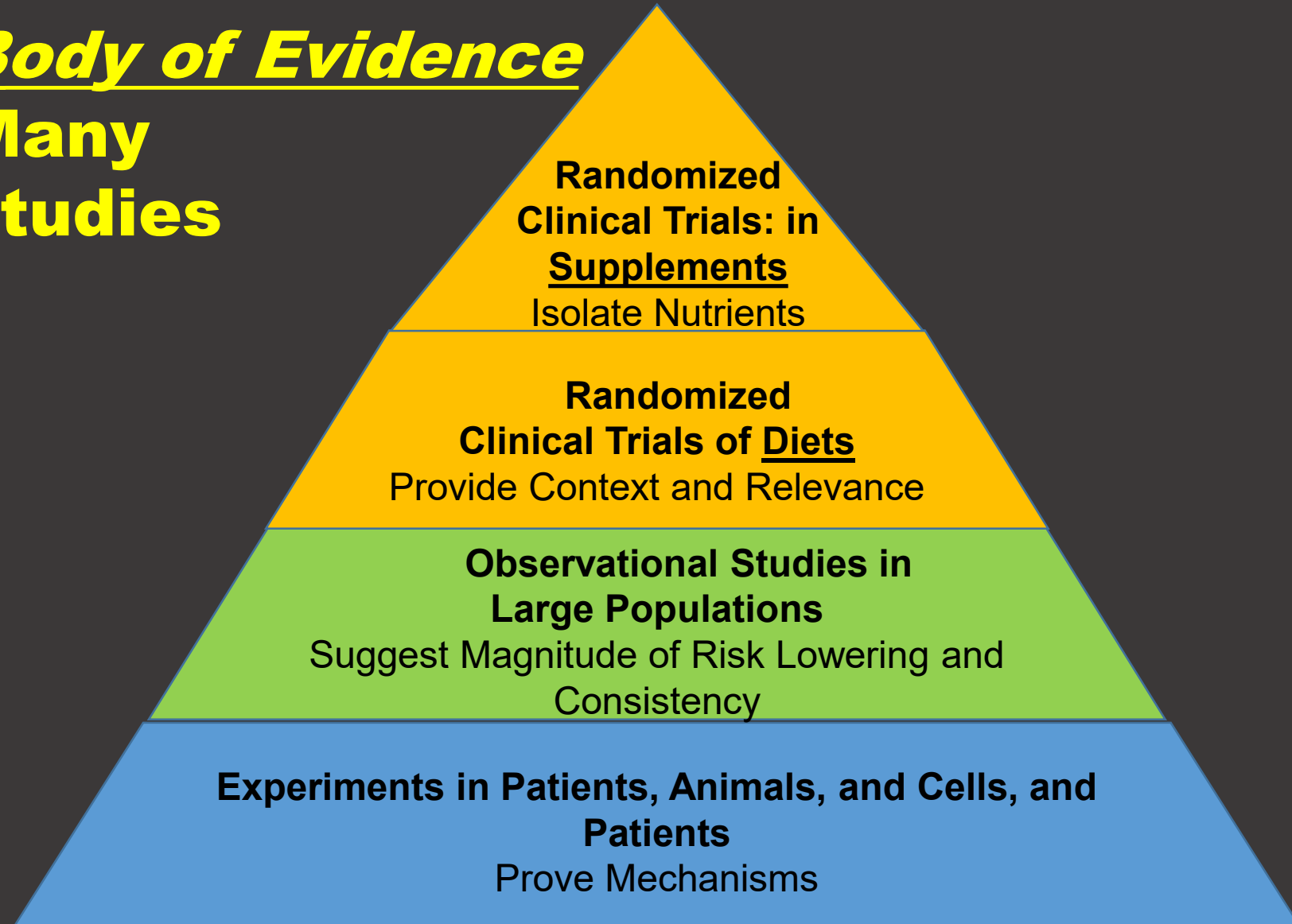
- Age
- Family history
- High eye pressure
- Diet and lifestyle (less studied)



**New Studies Show that
Eggs, Greens and Oranges are
Good for Eye Health!**



A Strong Body of Evidence Requires Many Types of Studies





The Evidence: Nutrition Matters

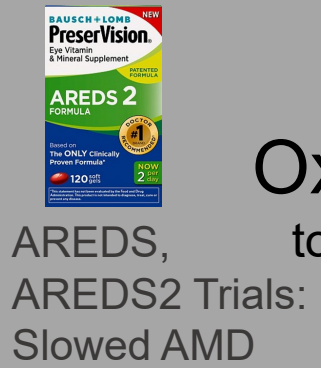
- **Clinical trials prove nutritional interventions:**
 - Lower risk for chronic diseases that are promoted by processes that also promote poor eye health
(high blood pressure or blood sugar, oxidative stress, inflammation)
 - Slow the progression of age-related macular degeneration (AMD): AREDS1 and AREDS2
 - Improve vision (New, early research)
- **Population studies suggest that healthy diets:**
 - Lower chances of having early AMD
 - Work synergistically with physical activity and not smoking

Antioxidants and Nerve Cell Degeneration in AMD (and Glaucoma)

Protection:

Supplemental antioxidants

- Vitamin C
- Vitamin E
- Lutein (replaced beta-carotene)
- Zinc (with copper)



Dietary antioxidants from fruits, vegetables, and whole grains,



Support Healthy Gut Microbes



Oxidative Damage to lipids, proteins, DNA


Oxidative Stress

Inflammation

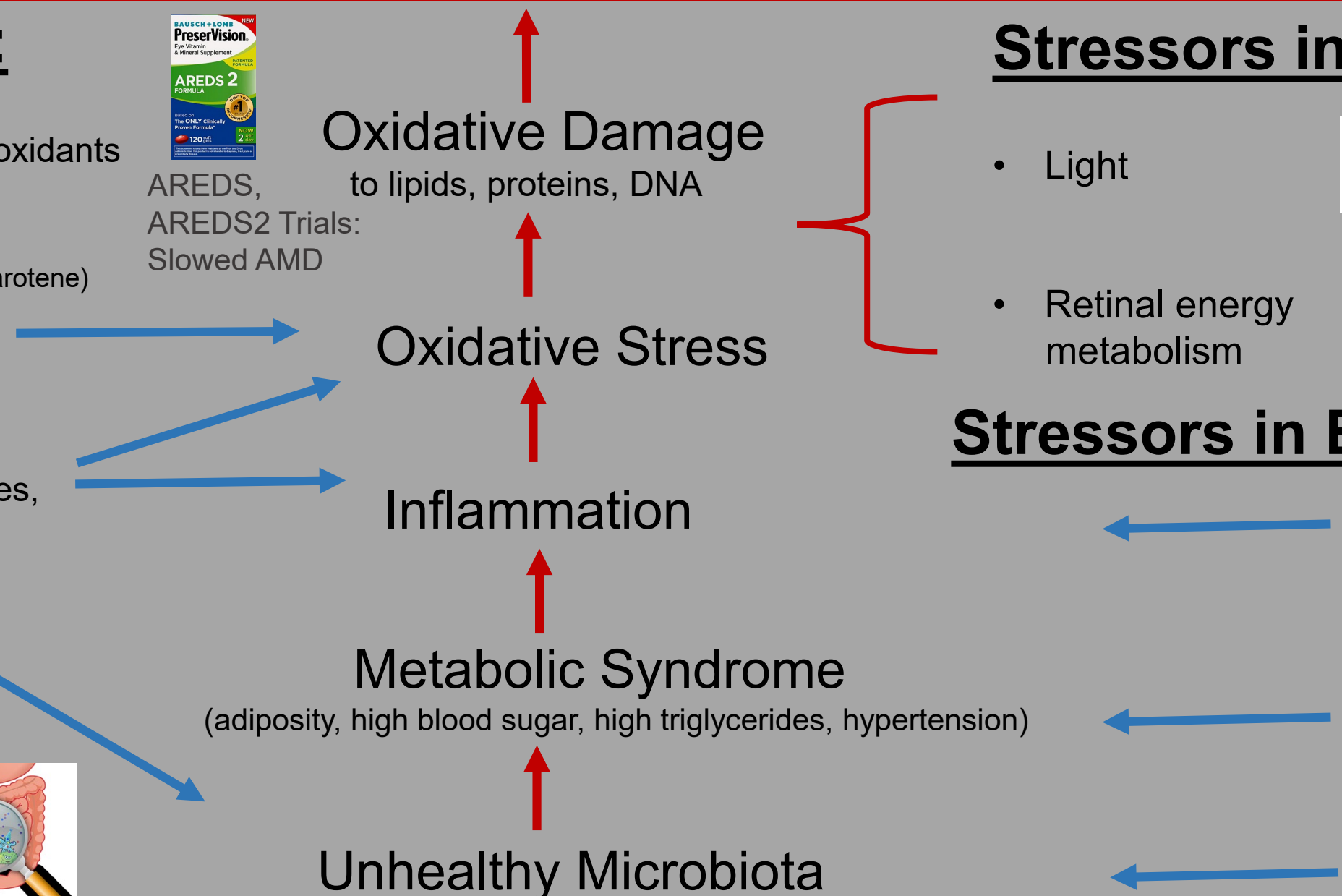
Metabolic Syndrome (adiposity, high blood sugar, high triglycerides, hypertension)

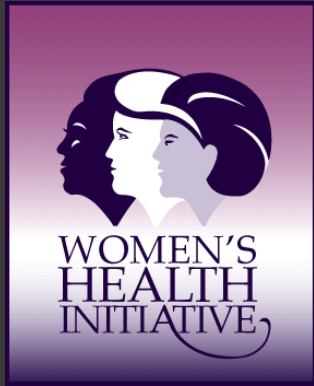
Unhealthy Microbiota

Stressors in Eye:

- Light 
- Retinal energy metabolism

Stressors in Body:





The Carotenoids in Age-Related Eye Disease Study (CAREDS) of the Diet and Vision Study in women (53 to 86 years)



WHI
1994-98
Observational Study
93,676 women

6 years

CAREDS
2001-04
2,005 women

15 years

CAREDS 2
2016-2018
674+ Women

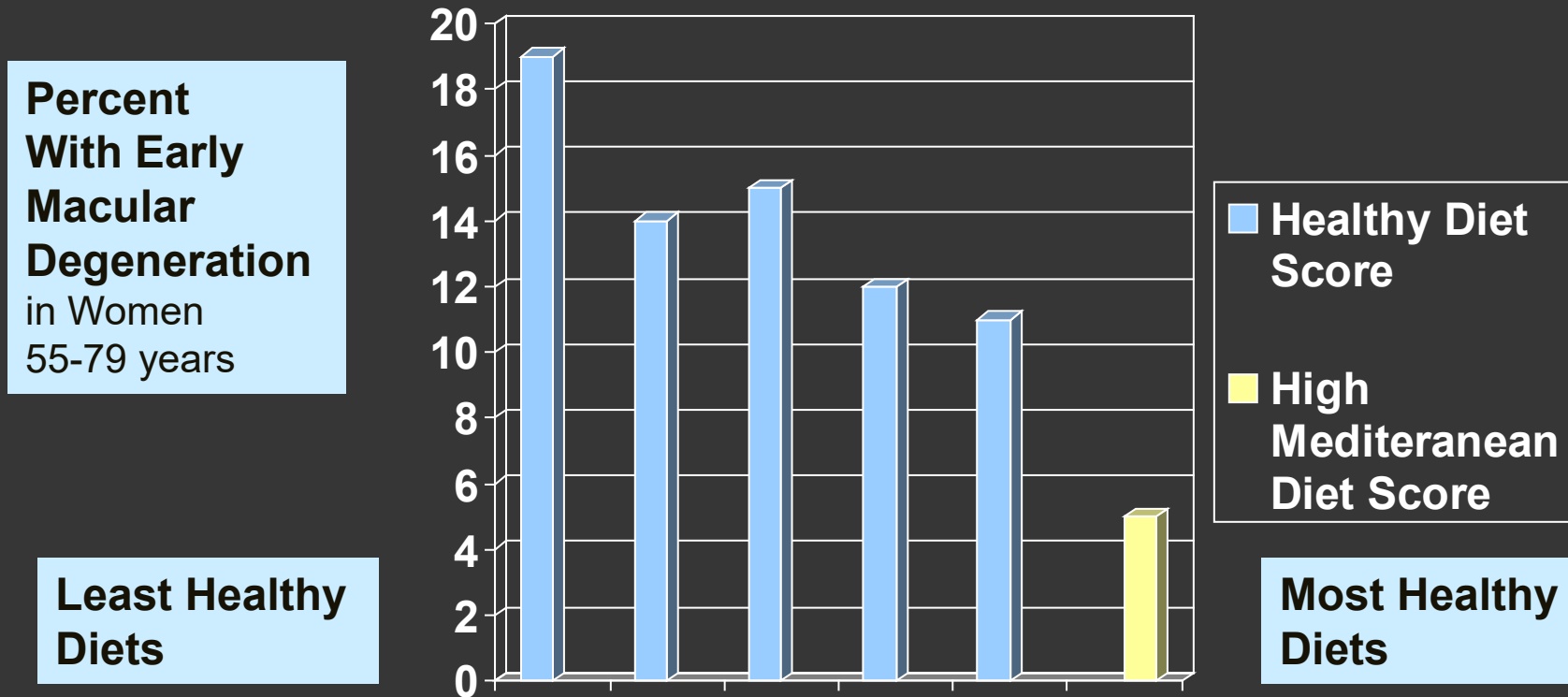
- Diet, lifestyles and health histories
- Blood: For nutrient, lipid and genetic information

- Macular pigment density
- Intake: Diet, Supplements
- Photographs of retina and lens
- Vision function tests

- Macular pigment density
- Intake: Diet, Supplements
- More retina imaging
- New vision function tests

WHI: ANNUAL FOLLOW-UP

Healthy Diets Lowered Age-Related Macular Degeneration Presence 2 to 3 fold

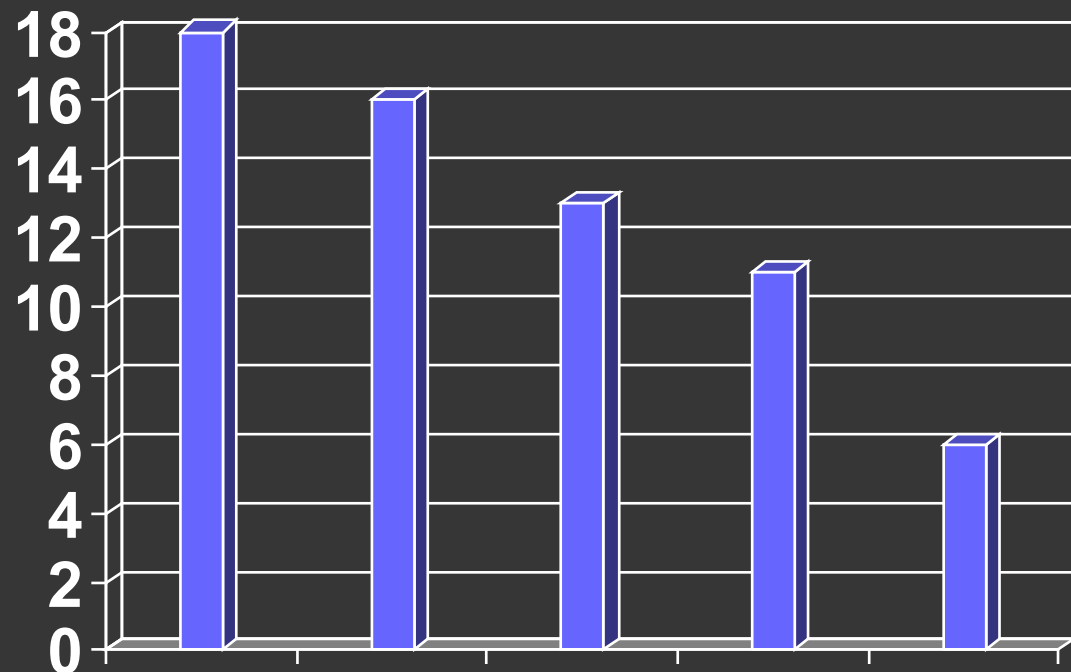


from CAREDS, Mares et al. 2011, Arch Ophthal

A Combination of Healthy Lifestyles: Lowered Estimated Risk for AMD 3-Fold

Percent with
Early
Macular
Degeneration

Among Women
50 to 74 years



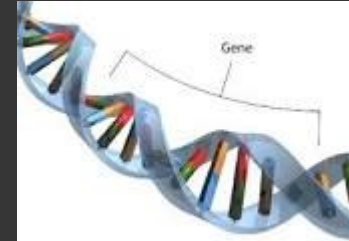
Lowest
Healthy
Lifestyle
Score

Highest
Healthy
Lifestyle
Score

No Regular Exercise
Healthy Diet Scores: lowest 20%
Smoked (more than 8 years)

Moderate Exercise:
8-10 hours per week
Healthy Diet Scores:
highest 20%
Never Smoked

Healthy diets and lifestyles lowered estimated risk for AMD associated with high genetic risk

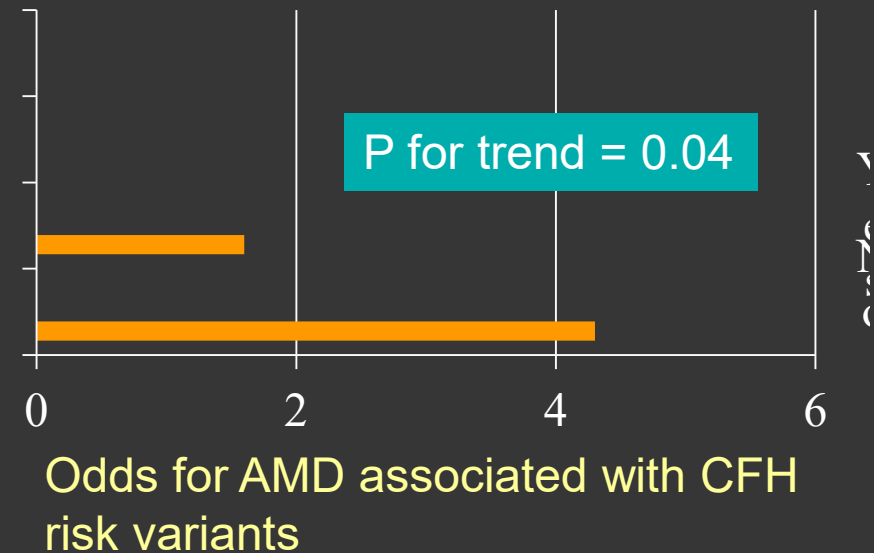


Healthy Life Style Score:

- Nutrient- Rich Diet
- Physical Activity
- Low Lifetime Smoking

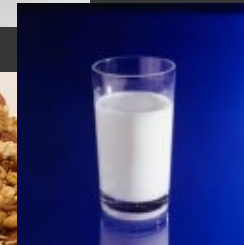
High

Low



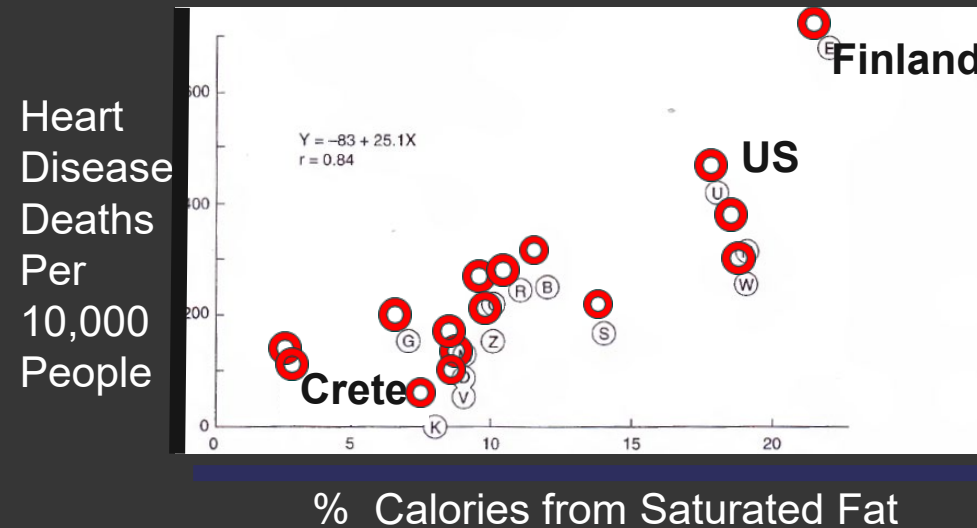
*In women with stable diets from CAREDS, Meyers et al., 2015, Ophthalmology

What is a Healthy Diet?



HEALTHY DIET PATTERNS

- **Mediterranean:** Modeled after long living men on Crete
- **Dietary Approach to Stopping Hypertension (DASH)**
- **US Dietary Guidelines**



HEALTHY DIET PATTERNS

--Similarities--

- Mediterranean
- Dietary Approach to Stopping Hypertension (DASH)
- US Dietary Guidelines
- Abundant in Fruits and Vegetables
 - Whole
 - 5 to 9 per day (1-2/meal)
- Contain
 - **Whole** Grains
 - A Daily Variety of Protein Sources
 - Plants (nuts, beans, legume)
 - White Meat, Fish, Eggs, Dairy (> 2/week)
 - Red and Processed meat <2/week

Long-lived men on Crete also had high levels of physical activity

In sun:

Sets biorhythms for a healthy night sleep

Gives skin a chance to make vitamin D



Food, wine, in the context of social interaction



Some differences in Mediterranean Diets with relevance for AMD

Emphasize higher intake of:
Omega-3 fatty acids
(Fish, nuts, olive oil)

Greens





Fish/Seafood also Provides Nutrients related to Healthy Eyes and Lower AMD Risk

- Vitamin D
- B vitamins
- Minerals (selenium, zinc)

Greens

- Salads, stewed
- Herbs
- Teas



Lutein protects our eyes (and plants) from light damage

LUTEIN

(MACULAR PIGMENT):

WHITE
LIGHT

BLUE
LIGHT

Light

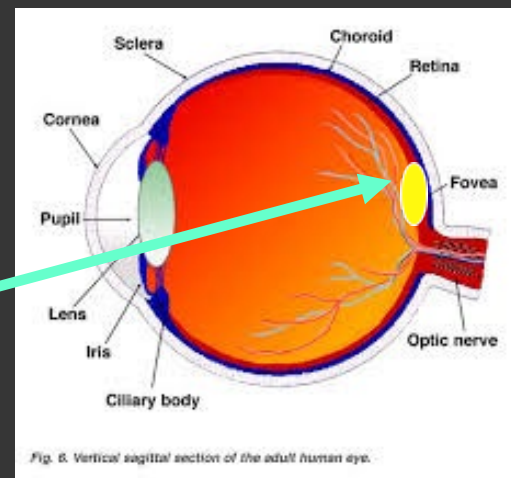
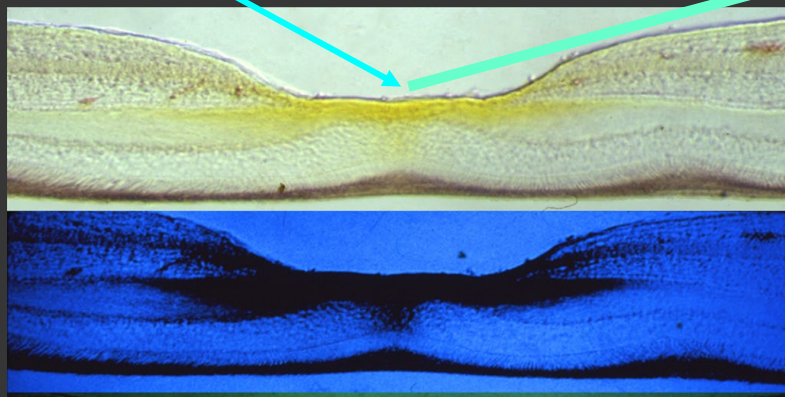


Fig. 6. Vertical sagittal section of the adult human eye.

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MOST ABUNDANT CAROTENOIDS



- Beta-carotene
- Alpha-carotene
- Beta-cryptoxanthin

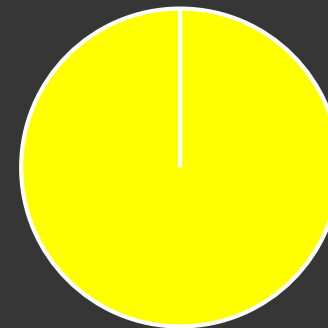
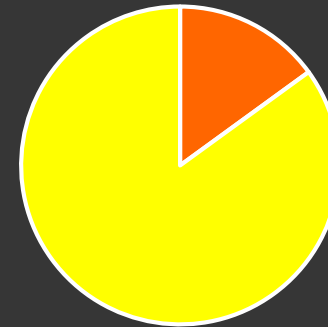


- Lycopene

2 Vitamin A

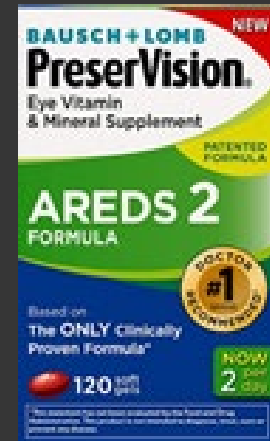


- Lutein (and Zeaxanthin isomers)



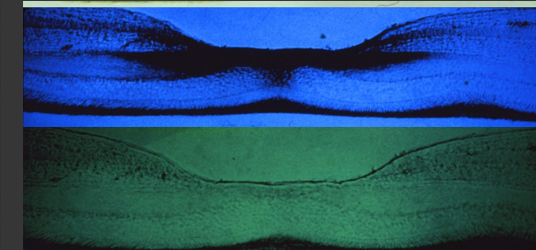
American Academy of Ophthalmology Recommended AREDS2 Supplement Contains:

- Lutein (10 mg) and Zeaxanthin (2 mg)
(replaces beta-carotene)
- Vitamin C: 500 mg
- Vitamin E: 400 IU
- Zinc: 80 mg (with 2 mg copper)



Supplement Tested

Measurement of Lutein and Zeaxanthin Pigments in the Back of the Eye “Macular Pigment” -Simple, Non-Invasive-



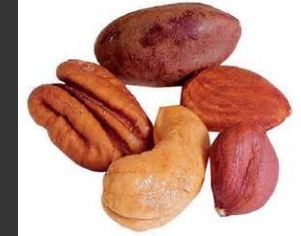
© Max Snodderly, 2002

2001-2004: Macular pigment was higher in women who...

2. Consumed healthy fats

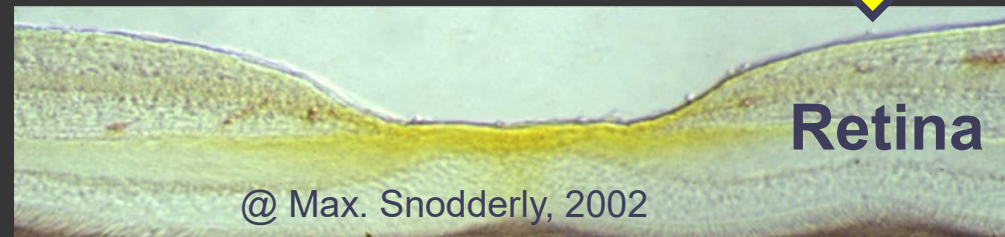


3. Had high fiber diets



Intestine

1. Had gene variants for proteins that help us take lutein
 - Into our body
 - Through our blood
 - Into our retina



Retina

@ Max. Snodderly, 2002

CAREDS2": 2016-2018

Early findings...

Fifteen year increases in macular pigment levels were more common in women who:

Had low levels ~ fifteen years earlier

Obtained lutein in AREDS2- type supplements (10-12 mg/day)

Ate eggs: 5 to 6/week



Preserving Vision



- Things We Cannot Control:

- Our genes
- Our outside environment



- Things We Can Do For Ourselves:

- Avoid excessive sunlight
- Don't smoke
- Eat well
- Be active
- Consider supplements, if needed.

We pass along our genes. Consider passing along our healthy lifestyles





Summary

Preserving Eye Health

- Enjoy real food (All types; mostly plants)
- Move and enjoy the outdoors
- Pass it on

Based on research conducted by many, and supported by taxpayers and **participants**.

University of Wisconsin:



...and Collaborators at 8 Universities



Thank you!



Resources:

Consumer lab: Independent supplement testing; accurate and frequently updated health information <https://www.consumerlab.com/>

The Nutrition Source: Harvard SPH.

<https://www.hsph.harvard.edu/nutritionsource/>

Nutrition Action Healthletter: Center for Science in the Public Interest.

<https://cspinet.org/nutrition-action-healthletter>

Our team Website:

<http://nutritionforeyes.opth.wisc.edu/>

October 10, 2019