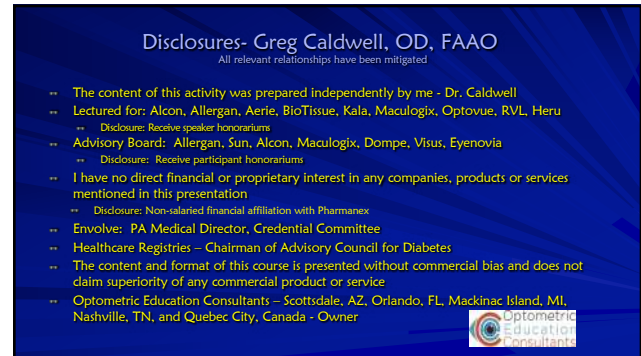


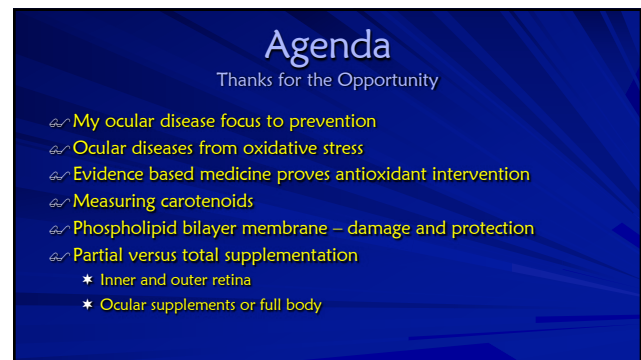
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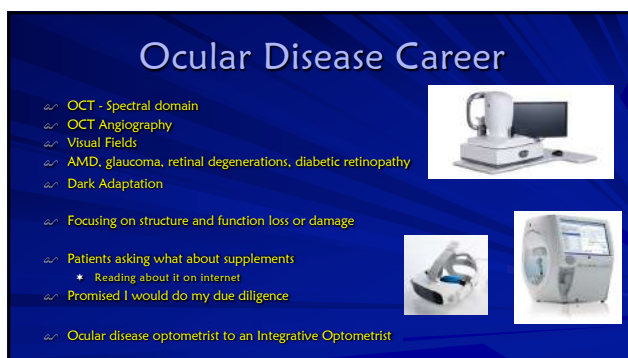
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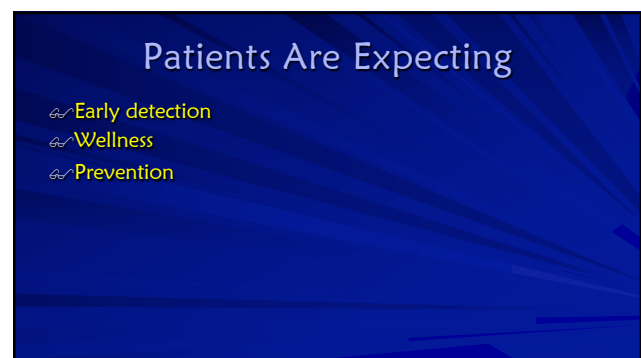
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6



7



8

Question?

Who in here would consider themselves as an integrative optometrist?

Who has done or recommended?

- * Supplements, vitamins, AREDS2
- * Omegas, EPA, DHA
- * Vital tears – ASED
- * Regener-Eyes
- * Amniotic membranes
- * CBD
- * Probiotics

9

Allopathic vs Integrative Medicine

- Allopathic medicine" is a term used for modern or mainstream medicine
 - * Conventional medicine, mainstream medicine, Western medicine, biomedicine
 - * Treating conditions and symptoms with its "opposite"
 - * Health system in which medical doctors, nurses, pharmacists, and other healthcare professionals are licensed to practice and treat symptoms and diseases
 - * Using medication, surgery, radiation, therapies, and procedures
- Complementary and integrative medicine are commonly used along with mainstream medicine
 - * Homeopathy, naturopathy, chiropractic care, Chinese medicine
- Allopathic or modern medical schools have recently added more study and information on how food and nutrition can help prevent and treat disease
 - * More education is being offered on integrative approaches and potential interactions with mainstream medicine

10

Medical Practices

- Allopathic medicine
 - * Western medicine
- Alternative "homeopathic"
- Functional
 - * Medicine of why, treat the cause
- Integrative medicine
 - * Complementary medicine - Eastern complementing Western

What is integrative medicine?

The practice of integrative medicine refers to the blending of conventional and evidence-based natural and complementary medicines and/or therapies with lifestyle interventions to deliver holistic, patient-centred care.

11

Chronic and Low-Grade Inflammation

Science has proven that chronic, low-grade inflammation can turn into a silent killer that contributes to cardiovascular disease, cancer, type 2 diabetes, diabetic retinopathy, cataracts, macular degeneration, and many other conditions



12

Chronic and Low-Grade Inflammation

Like cancers and other slow-burn diseases, identifying these conditions early can make the difference between full recovery or a dramatically reduced quality of life or even death (vision loss or blindness)



13

"Choose Your Parents Wisely"

- This just isn't as true as it's used to be
- Lifetime health
 - * 8% genetics "Picking your parents wisely"
 - DNA in our nucleus
 - Can't be influenced
 - * 92% epigenetics
 - Lifestyle choices = we can influence
 - Turn on/off gene expression

14

Biomarker

- ~ Test that has meaning
- ~ Biological molecule found in blood, other body fluids, or tissues that is a sign of a normal or abnormal process, or of a condition or disease.
- ~ A biomarker may be used to see how well the body responds to a treatment for a disease or condition
- ~ Blood pressure, blood work, heart rate, genetic testing, IOP

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Predictive Biomarker

- ~ Used to identify individuals who are more likely to respond to exposure to a particular medical product or environmental agent
- ~ The response could be a symptomatic benefit, improved survival, or an adverse effect
- ~ A value that we can guide therapy around
 - * HbA1c
 - * C-Reactive Protein
 - * Plasma Homocysteine
 - * Vitamin D (25-HydroxyD)
 - * Omega 3 index
 - * Carotenoid

16

Measure?



17

Chronic and Low-Grade Inflammation



18

DNA Sciences

- ~ Genomics = all of our genes
- ~ Genetics = individual genes
- ~ Epigenetics – the study of how our cells control gene activity without changing the DNA
 - * Internal and external environments

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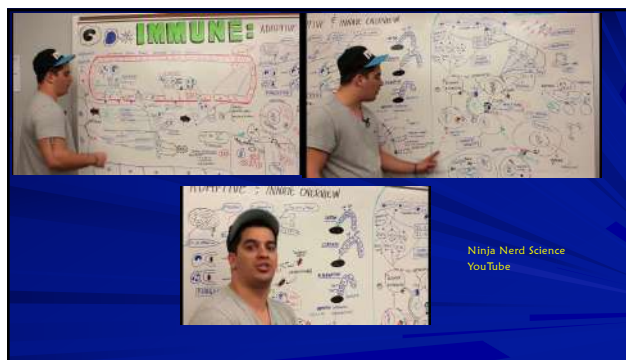
Exposome



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21

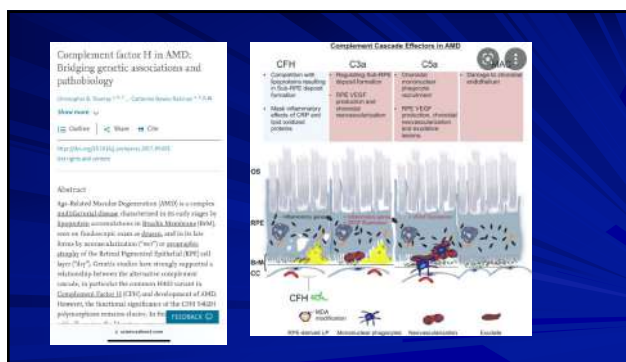


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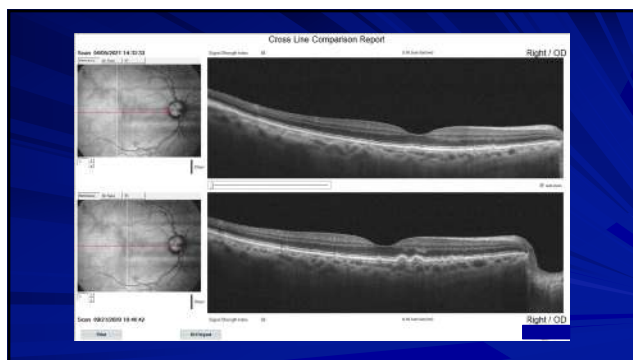
Ninja Nerd Science
YouTube



23



24

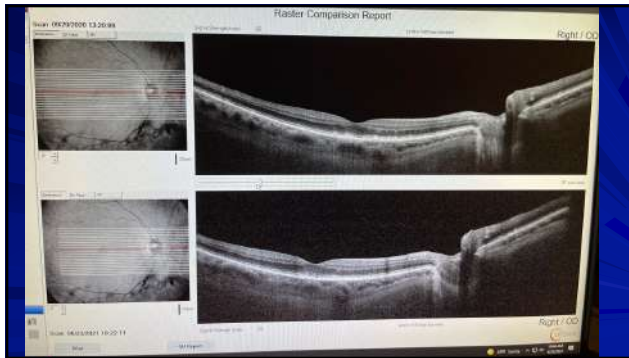


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26

Melanie Clemmons, OD
May 20, 2022 AACO Nashville



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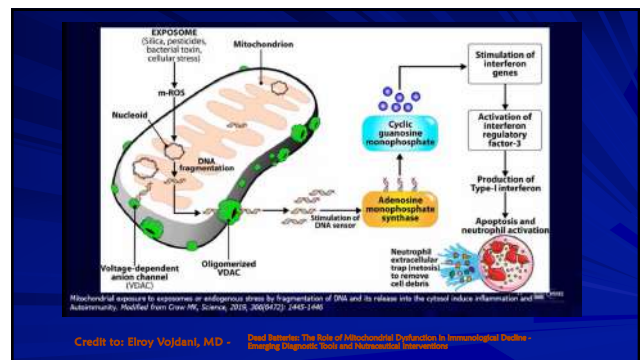
Inflamm-aging

One of the consequences of failing mitochondria due to aging, beyond mtROS, is the release of mtDNA. Plasma levels of mtDNA increase gradually after the fifth decade of life, correlating with elevated levels of pro-inflammatory cytokines (i.e., TNF- α , IL-6, RANTES, and IL-1 α).

These data indicate that mtDNA may promote the production of pro-inflammatory cytokines in aging. Because cell stress, senescence and death are a part of the pathophysiology of aging designing new therapeutic strategies against circulating mtDNA, or other mtDAMPs, or their cognate receptors (e.g., TLRs or FFR1) may be a viable strategy to approaching IA and its associated conditions.

Credit to: Elroy Vojdani, MD - David Reardon: The Role of Mitochondrial Dysfunction in Immunological Decline - Emerging Diagnostic Tools and Nutritional Interventions

29



30

Fun Facts I Have Learned About the Mitochondria

- ~ Mitochondria produce energy from organic matter
- ~ Live about 100 days
- ~ They produce 90% of energy in the body
- ~ In return they produce 90% of the free radicals
- ~ When they become dysfunction when get many clinical consequences
- ~ Mitochondria are very sensitive to reactive oxygen and need antioxidant support
- ~ Mitochondria are one of cellular organelles
 - * Electron transport chain - uses co-enzyme 10, and many other micronutrients
 - * Brain cell has 1-2 million/single neuron
 - * Heart cell has 5,000/cell
 - * Liver cell has 1000-2000/cell
 - * Photoreceptors 498/cell
 - * RPE cells >700/cell

The ellipsoid contains a densely-packed array of mostly elongated mitochondria arranged broadly parallel to the long axis of the photoreceptor. The cell contained **498 individual mitochondria**.

Credit to: Elroy Vojdani, MD - David Reardon: The Role of Mitochondrial Dysfunction in Immunological Decline - Emerging Diagnostic Tools and Nutritional Interventions

31


Question

~ Do you agree that free radical formation is a progressive process that leads to cell damage or death?


- * Yes
- * No

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Free Radicals and Antioxidants



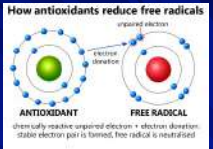
ANTIOXIDANT + FREE RADICAL → HEALTHY CELL



HEALTHY STABLE MOLECULE vs. UNHEALTHY UNSTABLE MOLECULE



How antioxidants reduce free radicals




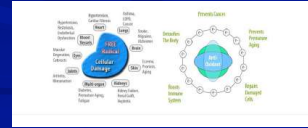
ANTIOXIDANT + FREE RADICAL → STABLE MOLECULE

chemically reactive unpaired electron + electron donation (stable electron pair is formed, free radical is neutralized)

33

Oxidative Stress

- Small percentage of oxygen is not completely reduced
- Accumulation of free radicals
- Oxidative damage
- Oxidative stress
- Considered the starting of several diseases
- Responsible for epigenetic alterations
- Mitochondria – vulnerable
- Not going to make this apple new again
 - Prevention is the one of the best medicines

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Free Radicals

- During metabolism the O_2 molecule splits and energy is released
 - Endogenous free radical formation
- Regain stability the free single oxygen atom (oxygen free radical) seeks and steals electrons from other molecules
 - Superoxide anion – will accept one electron
 - Peroxide – will accept two electrons
- These molecules can be proteins, lipids, and DNA
 - Proteins (enzymes) – kinases, phosphatases, and transcription factors

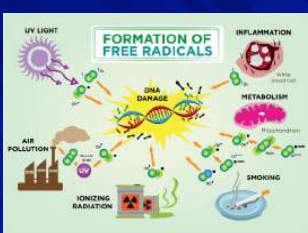
Reactive oxygen species (• = unpaired electrons)				
Oxygen O_2	Superoxide anion $O_2^{\bullet -}$	Peroxide $O_2^{\bullet -}$	Hydroxyl radical $\bullet OH$	Hydroxyl ion OH^-

35

Endogenous and Exogenous Free Radical Formation



Aerobic respiration



FORMATION OF FREE RADICALS

UV LIGHT, AIR POLLUTION, IONIZING RADIATION

Free radicals are formed from these sources and can cause DNA damage, inflammation, and metabolic issues.

36

Oh no

- Increasing exogenous free radicals
- Less antioxidant protection in our diet
- More bad and less good




Is an orange of the 1950's equivalent to 21 of today's oranges?

An orange from the 1950's was full of vitamin A, precious for our sight and our immune defenses. To attain the same amounts today, you would have to consume 21 of them. Onions and potatoes no longer contain any trace of it. The iron content in meat? Divided by 2. Calcium in broccoli? Divided by 4. To ingest the vitamin C contained in an apple from yesteryear, you would have to eat 100 today.

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The Equalizer



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October 23, 2021



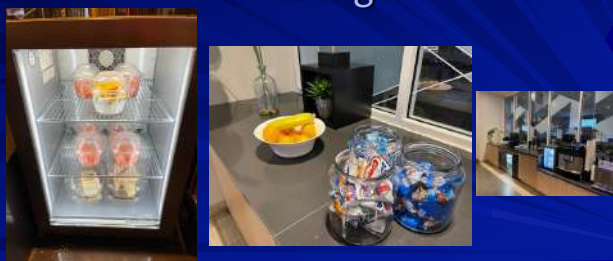
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October 23, 2021



40

M Lounge



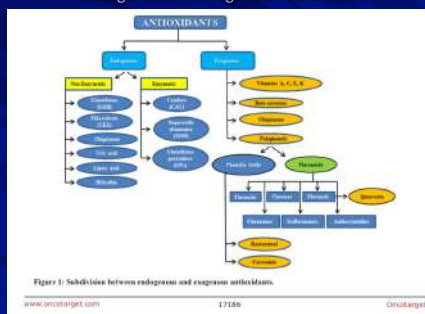
41

Nutritional Antioxidants

- ✓ Exogenous antioxidants
 - * Tocopherols (E), ascorbic acid (C), carotenoids, ubiquinone, and polyphenols
- ✓ Well know antioxidants
 - * Vitamin C, E, Beta-carotene, lutein, zeaxanthin, selenium, quercetin, and resveratrol
- ✓ Mechanisms of action;
 - * Neutralize free radicals
 - * Repair oxidized membranes
 - * Decrease reactive oxygen species
 - * Neutral reactive oxygen species

42

Endogenous and Exogenous Antioxidants



43

Carotenoids

- ✓ Why do hear so much about carotenoids
- ✓ Melonie Clemmons, OD May 20, 2022 AACO Nashville



44

Carotenoids

- Organic pigments produced by plants, algae, and bacteria
- Cannot be synthesized by the human body
 - Hydrophobic compounds
 - Important for the phospholipid bilayer
- 600 in nature – 50 human food chain – 15-20 human blood stream
- Macular carotenoids (L and Z) – highest concentration found in the human body
 - Diet derived
 - Henle fibers – between the inner and outer plexiform layers
 - Sequester or absorb blue light

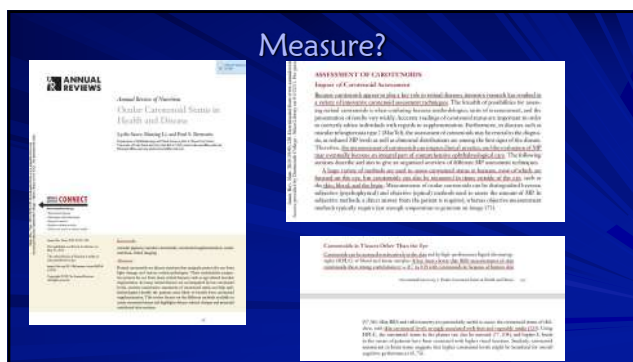
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Question

- Do you measure carotenoid levels in your office?
- Yes
- No

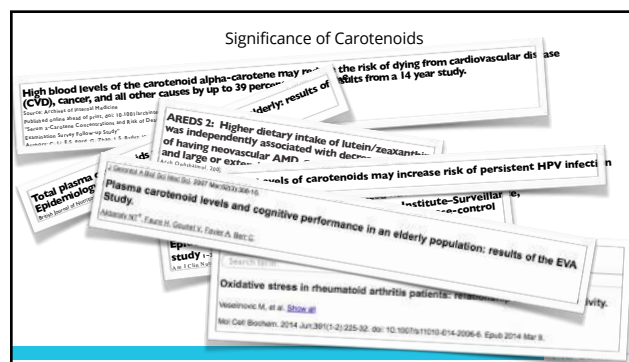
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Measure?



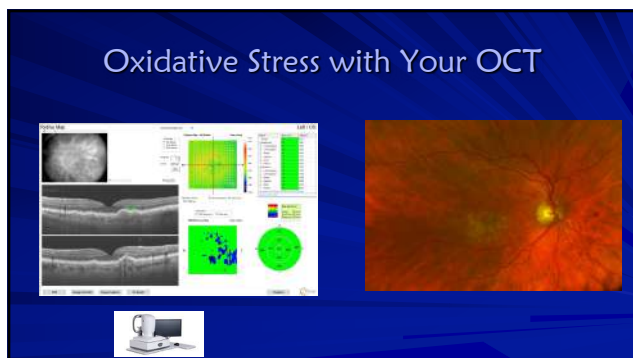
47

Significance of Carotenoids



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Oxidative Stress with Your OCT



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Oxidative Stress with Your OCT



50

Oxidative Stress with Your OCT



51

Healthy choriocapillaris, Bruch's, RPE, and Photoreceptors



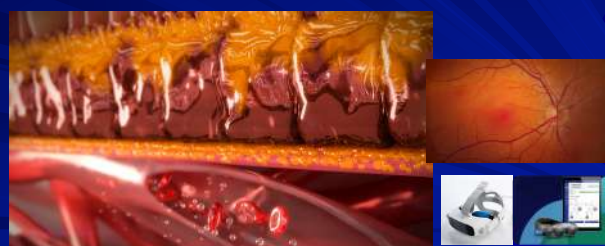
52

Cholesterol barrier deposited along Bruch's and RPE



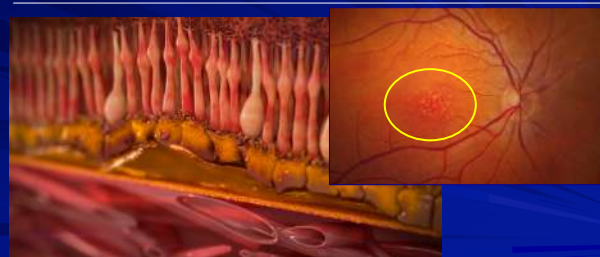
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RPE Secretes even more cholesterol and degenerates



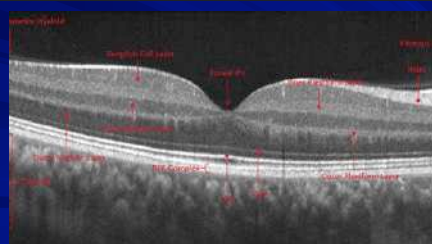
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Finally, visibly evident drusen on fundus evaluation

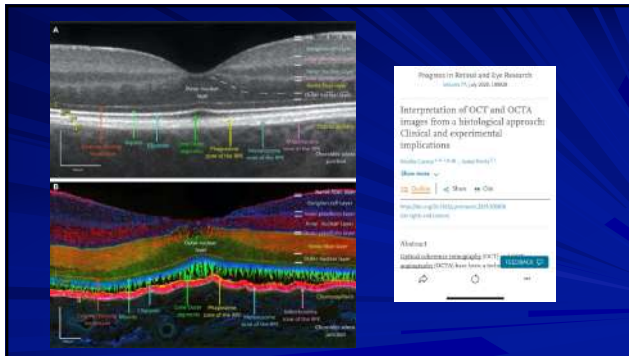


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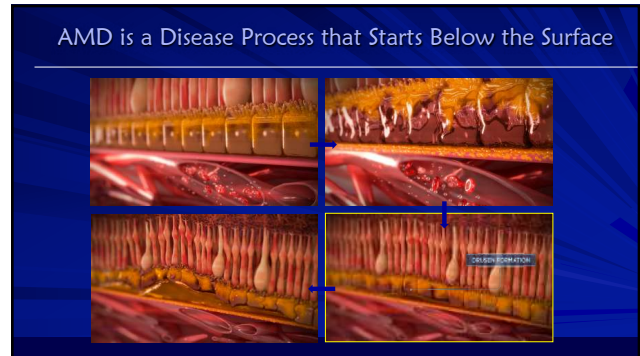
The ellipsoid zone (EZ) is considered to be formed mainly by mitochondria within the ellipsoid layer of the outer portion of the inner segments of the photoreceptors. However, it was previously known as the junction between the photoreceptor IS/OS).



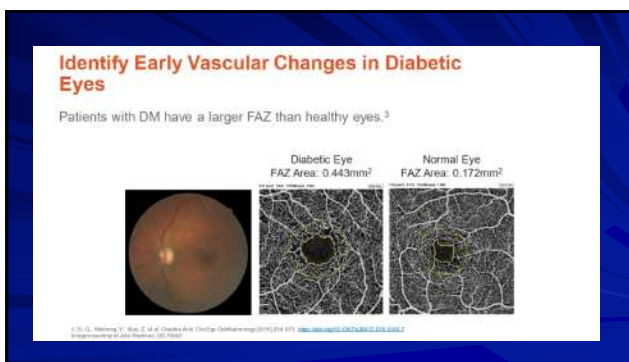
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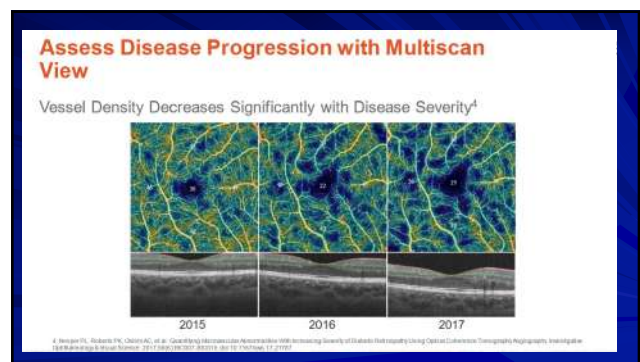
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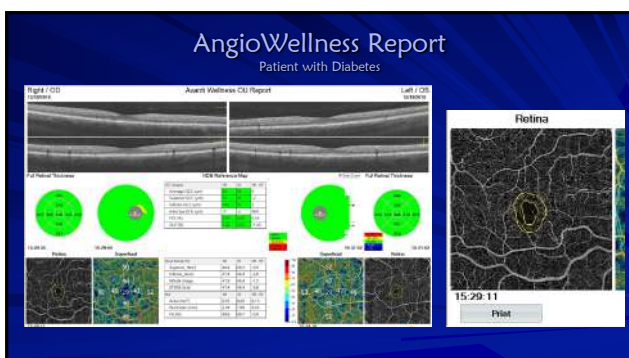
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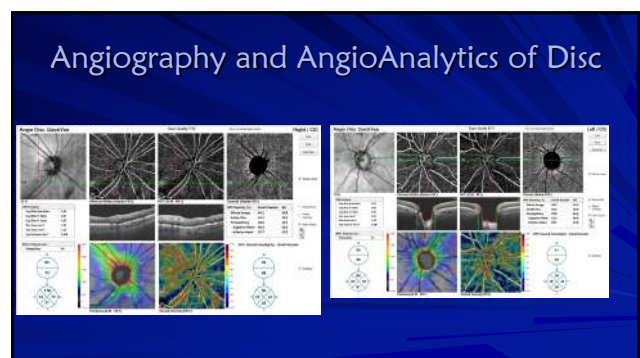
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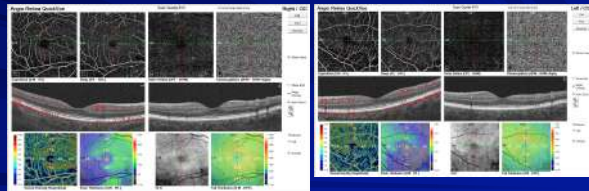


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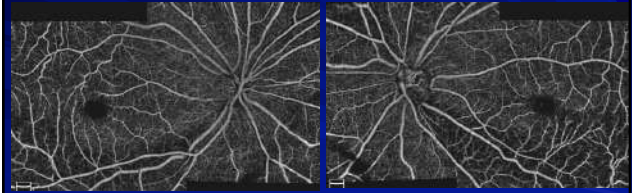
62

Angiography and AngioAnalytics of Retina

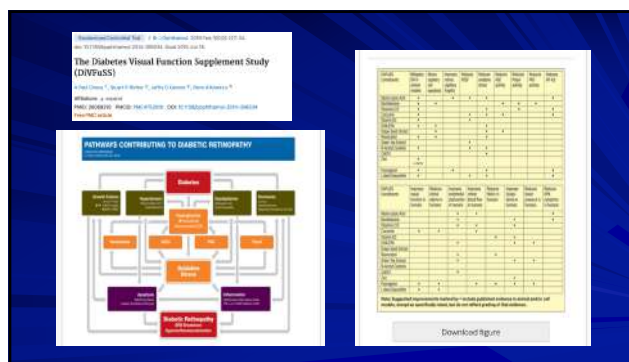


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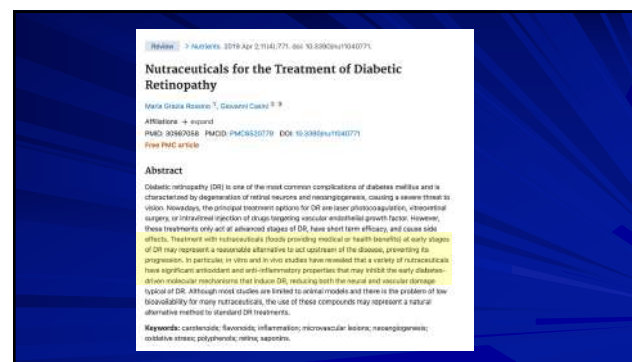
Montage OU



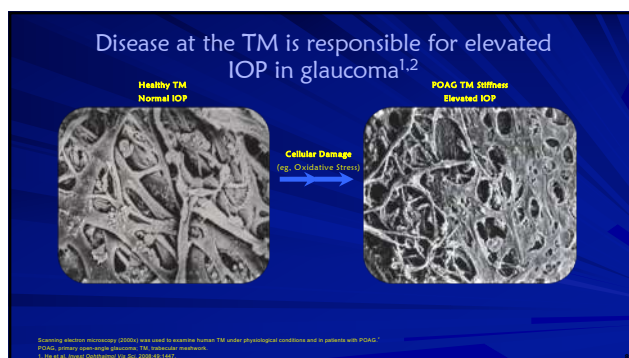
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66



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Glaucoma

PERSPECTIVES ON GLAUCOMA

Antioxidants enhance ocular perfusion in Open Angle Glaucoma

Harris A, et al. *Acta Ophthalmol.* 2018;doi:10.1111/aos.13530.

"In agreement with previous findings, our results indicate that the supplementation of certain antioxidants may increase blood supply to the orbit and within retinal capillary beds following 4 weeks administration," the authors wrote. "Our data suggest [oral antioxidant supplementation](#) may decrease vascular resistance over a longer period of time than previous trials investigated."

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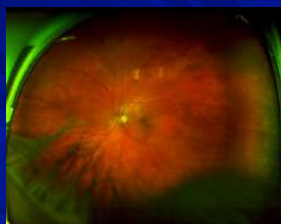
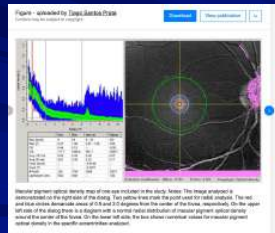
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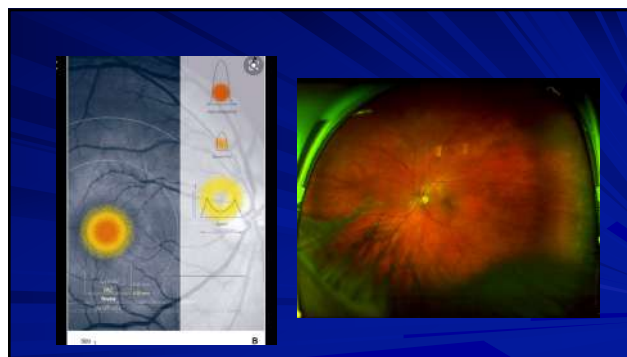
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Macular Pigment and the Retina

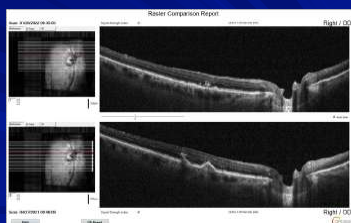
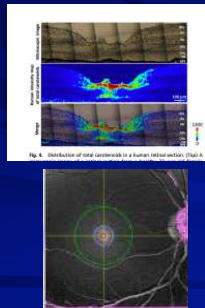


75



76

Macular Pigment



77

When it cold outside what are good for your feet and head?



78

Question

Do you recommend resveratrol and quercetin antioxidants when treating ocular/retinal conditions?

- ★ Yes
- ★ No

79

Why Are We Only Treating Half the Retina?



80

[illegible]

A color calibration target, likely a Munsell Color Services Lab target, featuring a grayscale step wedge and a series of color patches for color management and calibration.

Correlations between Maculae, Skin, and Serum Carotenoids

Christopher D. Cavanagh,¹ James O. Jell², Brian S. Beach,³ James Tomlinson,⁴ William E. Barlow,⁵ Greg Davidson,⁶ Robert Marshall,⁷ Mark Eriksen,⁸ Werner Gellerauer,⁹ and Paul T. Peto¹

¹Department of Epidemiology and Biostatistics, Harvard School of Public Health, 665 Huntington Avenue, Boston, MA 02115, United States

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⁴Department of Medicine, Harvard Medical School, 77 Avenue Louis Pasteur, Boston, MA 02115, United States

⁵Department of Medicine, Harvard Medical School, 77 Avenue Louis Pasteur, Boston, MA 02115, United States

⁶Department of Medicine, Harvard Medical School, 77 Avenue Louis Pasteur, Boston, MA 02115, United States

⁷Department of Medicine, Harvard Medical School, 77 Avenue Louis Pasteur, Boston, MA 02115, United States

⁸Department of Medicine, Harvard Medical School, 77 Avenue Louis Pasteur, Boston, MA 02115, United States

⁹Department of Medicine, Harvard Medical School, 77 Avenue Louis Pasteur, Boston, MA 02115, United States

Abstract The macula is a specialized area of the retina that is responsible for central vision. It is rich in carotenoids, particularly lutein and zeaxanthin, which are thought to protect against age-related macular degeneration (AMD). Serum carotenoids are also thought to be protective against AMD. We investigated the correlations between maculae, skin, and serum carotenoids in a population-based study of 10,000 individuals. The results show that maculae, skin, and serum carotenoids are all correlated, and that the correlations are stronger for lutein and zeaxanthin than for other carotenoids. These findings support the hypothesis that carotenoids play a role in the prevention of AMD.

Keywords: Carotenoids, Macula, Skin, Serum, Correlations

- Quick Test (approx. 30 sec)
- Portable
- Cost Effective
- Remeasure in 60 days
- Reassurance to you and patient

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ARVO STUDY

Interrelationships between Macula, Skin and Serum Carotenoids- Paul Bernstein, Werner Gellerman et al
ARVO May 2016

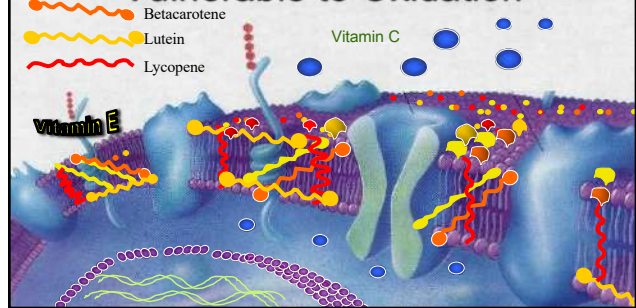
Conclusions:

"Our results emphasize the importance of measuring the total amount of carotenoids in the macula region using an objective image based modality such as AFI w Spectralis rather than subjective MPOD."



87

Vulnerable to Oxidation



88

Are you taking a supplement?

89

53-year-old man

- Family history of AMD
 - Dad with 43 injections for AMD
- Pre-diabetic with borderline HbA1c
- Vision 20/20 OU
- DFE- retina clear
- OCT normal
- Passes dark adaptation

CONGRATULATIONS ON TAKING THE FIRST STEPS
TOWARDS OPTIMIZING YOUR SCS

Recently on 12/15/2020, you met with me and I captured the part of your hand with the BioPhotonic Scanner. Your scan returned a Skin Cancerous Score (SCS) of 15600.



290

90

Ingredients

[illegible]

Carbon on Carbon Catalysts (15-Carbon Model)		
Carbon Acetylene	250 mg	99%
Carbon on Platinum Catalyst	250 mg	99%
Aluminum on Magnesium Oxide, Magnesium Oxide	250 mg	99%
Al to Zn, Biocatalyst	250 mg	99%
Carbon on 1,5-Dimethylbenzene, Sulfur Catalyst	250 mg	97%
Carbon on Copper Biocatalyst	250 mg	95%
Carbon on Hexagonal Boron Nitride	250 mg	95%
Carbon on Chromium Oxide Biocatalyst	250 mg	95%
Chromium on Chromium Oxide Biocatalyst	250 mg	95%
Monocarbon on Monocarbon Biocatalyst	250 mg	95%
Polycarbon and Hexagonal Boron	250 mg	95%
Carbon from Carbonic Nitrogen and Extract	250 mg	95%
Diamond	250 mg	95%
Simple Solid Extract on Zn, Biocatalyst	250 mg	95%
Carbon Biocatalyst from Zinc Oxide	250 mg	95%
Carbon on Magnesium Oxide (not extract)	250 mg	95%
Most Biocatalyst (Zinc, Zinc, Zinc, Zinc)	250 mg	95%
Aluminum-Like	250 mg	95%
Carbon on Nickel	250 mg	95%
Carbonized Silver	250 mg	95%
Carbon on Silver	250 mg	95%
Carbon from Magnesium Phosphate Extract	250 mg	95%
Carbon from Silver	250 mg	95%
Carbon from Silver	250 mg	95%
Carbon from Silver	250 mg	95%

OTHER INGREDIENTS: Glycerin, Methylparaben, Cellulose, Croscarmellose Sodium, Stearic Acid, Magnesium Stearate, Silicon Dioxide, Titanium Dioxide.

CONTAINS: Fish/Cod, Potato, Hardboiled Egg, Cuck, Roastbeef, Saus, Friedrice

SUPPLEMENT FACTS

Supplement Facts

[illegible]

^{***} Daily Value (%): not established.

OTHER INGREDIENTS: Gelatin, Glycerin, Beeswax, Sunflower Lecithin

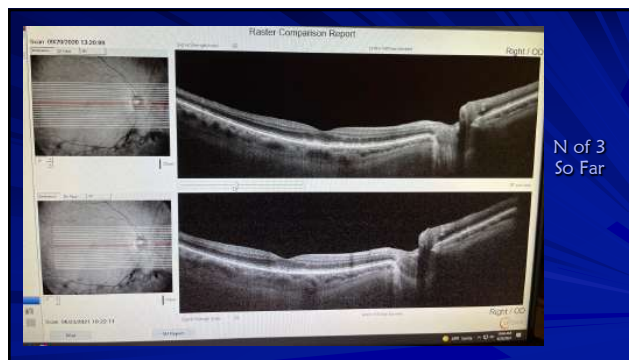
CONTAINS: Fish (anchovies, sardines, mackerel)

91

92



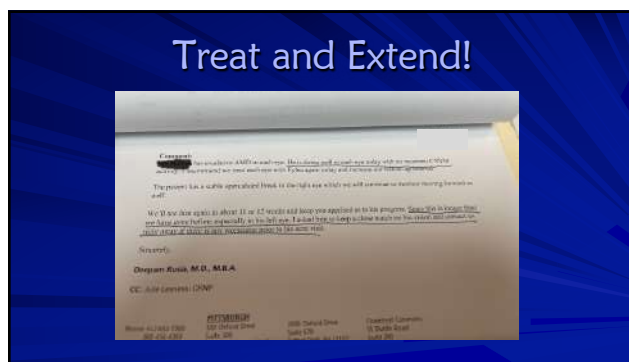
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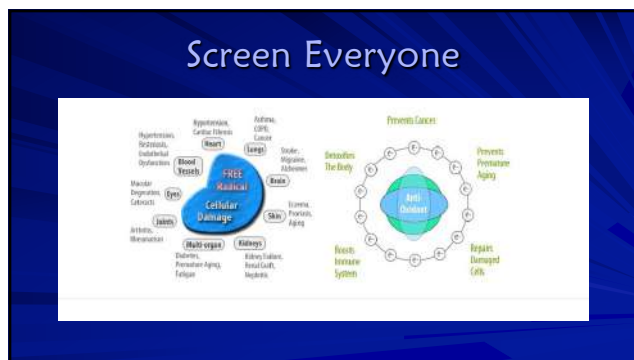
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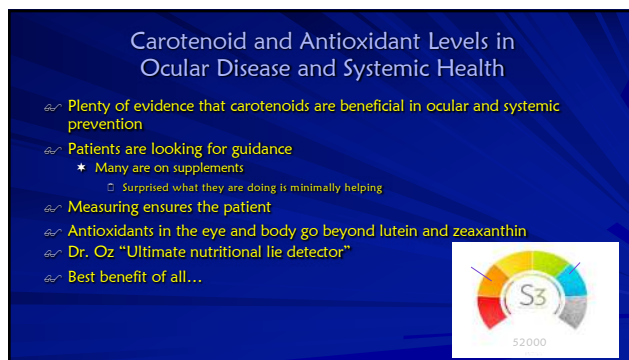
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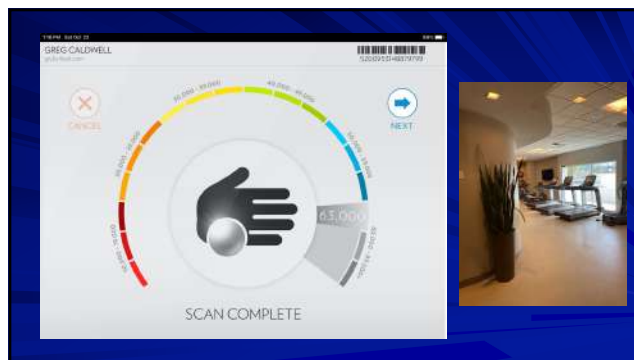
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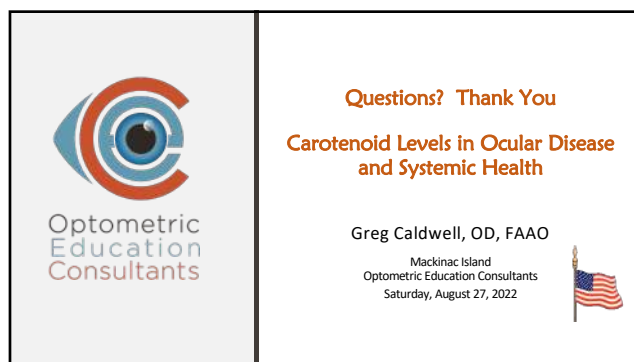
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