Macular Degeneration: Awareness and Prevention
OLLI HES talk 10/14/16

Kim Walters, OD
Optix Eye Care
Weaverville, North Carolina

Gary Morgan, OD
Blue Light Consulting, LLC
Yesterday **833** people went blind in the United States from AMD.
According to the National Eye Institute (NEI):

“The #1 line of defense for preventing blindness is a yearly comprehensive eye examination.”
The Facts…
Age-Related Macular Degeneration

AMD

- Background Information
- Risk Factors for Disease
- Early Detection & Monitoring of Disease
- Anatomy of the Macula… Disease Process
- Macular Pigment, our internal protection
- Proper Nutritional Supplementation
- Blue Light Dangers…External Protection
AMD Facts

- Leading cause of blindness for those over age 55 in the United States
- More common than Alzheimer’s, Breast Cancer, Prostate Cancer, and Parkinson’s disease combined.
- Inherited disease that affects 1 in every 5 families
- Smokers 3x greater risk
People with Vision Loss

- Nursing home admissions 3 years earlier
- Suffer *twice* as many falls
- *3x* higher incidence of depression

Patients with AMD would trade *30%* of remaining life to regain vision.
Over 60

1 in 10

Over 70

1 in 4
Beginning January 1st 2011 every single day more than 10,000 Baby Boomers will reach the age of 65. That is going to keep happening every single day for the next 19 years.

http://endoftheamericandream.com

**epidemic:**
Affecting or tending to affect a disproportionately large number of individuals within a population; usually something unpleasant

2.7 million new Dry AMD patients per year in North America until 2050, on top of 15 million existing patients

1.7 million existing Wet AMD patients w/vision loss and 210K new cases per year requiring monthly treatment

Only 1,800 Total Retina Specialists in North America
Macula
AMD – Two Stages

- Normal Macula
- Dry AMD (can be severe)
- Wet AMD
Since First Described...

Macular Degeneration = Blindness
For Years Doctors Have Searched

- What genes cause AMD?
- Which patients will develop severe AMD
- What can stop blood vessel growth in Wet AMD?
- What can protect the macula from Dry AMD?
Now We Know!

- 70% of AMD attributable to Genetic Risk
- Patients at High Risk can be seen more frequently
- Studies show when Wet AMD caught early, much better visual outcome with treatment
Age-Related Macular Degeneration is the most genetically influenced of all human multigenic diseases.

2011
AMD Risk Factors

- Family History, Genetics
- Low Macular Pigment Density
- Gender, More Common in Women than Men
AMD Risk Factors

• Smoking

• Diet, Obesity, High Cholesterol (American Lifestyle)

• LED Lighting, LED Screens
• Sun Exposure

*Blue Light*
What can Stop Wet AMD?

• Significant advance in treatment over last 5-7 years

• Anti-VEGF… Shots in the eye!

Not as bad as it sounds…
AMD’s EFFECT ON VISION, QUALITY OF LIFE

Dry AMD

20/40 chronic cardiac angina

20/80 permanent renal dialysis

<20/200 severe stroke requiring constant nursing care.

End stage Dry AMD / Wet AMD

Quality of Life Detriment

© 2015 Vision Service Plan. All Rights Reserved
What can Protect the Macula From Dry AMD?

- AMD is an Oxidative Process
- Another Oxidative Process is Rust
- Dry AMD = RUST
PREVENTION, PROTECTION, VISUAL ENHANCEMENT

Protective Pigments in the Eye

Ocular Lens Pigment

Macular Pigment
FUNCTIONS OF MACULAR PIGMENT

**Visual Performance**
- Enhances contrast sensitivity, visual acuity
- Diminishes light scatter and glare

**AMD**
- Shields RPE from blue light radiation
- Strong antioxidant properties, carotenoids freely donate electrons to neutralize free radicals

**Prereceptoally filters Blue Light**

---


• Over 600 carotenoids found in nature
• 50 found in typical American diet
• 22 found in Blood
• 14 isolated in blood serum
• Only 3 found in the Macula

“only MZ, L and Z are found at the macula, reflecting an exquisite degree of biological selectivity, which is unlikely to be accidental in design”

MACULAR CAROTENOIDS

- Lutein
- Zeaxanthin
- Meso-zeaxanthin

1 cup diced = 1 mg
Can Macular Pigment be measured?

- **Densitometer** - Accurately Measures Macular Pigment (MPOD) in office.

Who should have the test?

- Have AMD
- Family history of AMD
- Light complexion
- Concerned about ocular health
SUPPLEMENTS

How do you know your patients are choosing the right eye supplement?

They depend on your knowledge and direction...

Rx supplements as you would any other drug!
DANGEROUS TO RX

Prescribing This... Can Lead to This:

Zinc
CFH and ARMS2 Genetic Polymorphisms Predict Response to Antioxidants and Zinc in Patients with Age-related Macular Degeneration

Carl C. Awh, MD,¹ Anne-Marie Lane, MPH,² Steven Hawken, MSc,³ Brent Zanke, MD, PhD,⁴,⁵ Ivana K. Kim, MD²

Ophthalmology  Volume 120, Number 11, November 2013
Macular Carotenoid Strength

Li, Ahmed, and Bernstein: 2010
Department of Ophthalmology and Visual Sciences
Moran Eye Center, University of Utah School of Medicine

M > Z > L
Strongest = MZL
Given the synergistic antioxidant properties of the three macular carotenoids, and that Meso-zeaxanthin is the major carotenoid component of the macular center where a lack of macular pigment is associated with increased risk of AMD, one is driven to conclude that a supplement must contain all three macular carotenoids.
MacuHealth contains all 3 Macular Carotenoids

- 10 mg Meso-zeaxanthin
- 10 mg Lutein
- 2 mg Zeaxanthin
MacuHealth® not just another “OTC eye vitamin”

- More expensive to produce than standard “eye vitamins”.
- Not sold in stores… without education, who would purchase?
- Available directly from company online or by telephone
- Optix Eye Care - Small supply kept in office for those that do not like to purchase online
PRACTICAL SUPPLEMENT RECOMMENDATIONS

Pre-AMD
• Family History
• Smokers
• High BMI
• Low MPOD
• Blue Light Exposure

Triple Carotenoid M, Z, L
BLUE LIGHT AND THE EYE

AMD

Sleep
Disturbance

Diminished
Visual Performance

Hammond, BR, Fletcher, LM. Influence of the dietary carotenoids lutein and zeaxanthin on visual performance: application to baseball, ACJN, October 2012
Blue Light Hazard
Blue Light Hazard

Oxidation = RUST

Inner Retina
Photoreceptors
RPE
Blue Light Hazard
ELECTROMAGNETIC SPECTRUM
BLUE LIGHT

HIGHEST ENERGY

LOWEST ENERGY

UV

IR

Wavelength (nanometers)

Blue Light
400 - 500 nm
Digital eyestrain, Glare, Contrast

Associated with AMD

Sleep patterns / Circadian rhythm

Blue Light
400 - 500 nm
Which light is most harmful to the eye?

UV Light?  Visible Light?

Which type of light is more likely to cause BLINDNESS?
UV radiation below 295 nm blocked by cornea
  - UV-B (280-315 nm)

UV radiation below 400 nm blocked by lens
  - some UV-B
  - all UV-A (315-400 nm)

*very young human lens transmits small window of UV at 320 nm

In general, UV light **does not** cause retinal damage, i.e. AMD
UV LIGHT DANGERS

UV LIGHT CAUSES:

- Cancers of ocular adnexa
- Pterygia
- Pinguecula
- Photokeratitis
- Cataract

In reality, rarely do any of these lead to blindness in the United States...

SOURCES OF BLUE LIGHT

How are we protecting patients?
UNINTENDED CONSEQUENCES

The unintended consequences of the "Greening of America"

The unintended consequences of Technology
IN VIVO BLUE LIGHT RETINAL DAMAGE

Tanito et al. IOVS, April 2007, Vol. 48, No. 4
Low intensity, 750 lux LED and CFL light exposure, measurements at 9 and 28 days

- Blue LED
- White LED
- White CFL
- Yellow CFL

Looked for Functional, Histological, and Biochemical damage
White Light– Emitting Diodes Injury in a Rat Model

Published online 2013 Dec. doi: 10.1289/ehp.1307294
BLUE LIGHT IN VIVO: HISTOLOGIC DAMAGE

Histology

Control

Blue LED 9 days

White LED 28 days

White CFL 9 days

Yellow CFL 9 days

White LED 9 days
Q: At what intensity and duration of exposure will blue light cause damage in humans?

A: As of yet... unknown
BLUE LIGHT HAZARD – YOUTH AT GREATEST RISK

Generation M²: Media in the Lives of 8 to 18 Year Olds. Kaiser Family Foundation Study, January 2010

Kids 8-18 years old are spending 7.5 hrs. a day viewing LED back lit screens!
More blue light exposure today than at any point in human history

Intensity = $1 / \text{distance}^2$

At what duration of exposure and at what intensity will damage occur?
Casting light on sleep deficiency

The use of electric lights at night is disrupting the sleep of more and more people says Charles Czeisler, Division of Sleep Medicine, Harvard Medical School.

“Just as the ear has two functions (hearing and balance), so too does the eye”

Nature 497, S13 (23 May 2013) doi:10.1038/497S13a 22 May 2013
Peak Melatonin suppression occurs when exposed to blue light between 459-484 nm.

BLUE LIGHT – IMPACT ON DAILY VISION

Chromatic Aberration

550nm
640nm
460nm
THE FOVEA IS DEVOID OF BLUE PHOTORECEPTORS

MACULA
• RED 65%
• GREEN 33%
• BLUE 2%
BLUE LIGHT EFFECTS ON VISION

Visual Acuity

Light Scatter, Glare

Contrast Sensitivity

SPECTACLE LENSES: FIRST LINE OF PROTECTION

Blue blocking AR coatings

En Masse Lenses
BLUE BLOCKING AR COATINGS


EN MASSE BLUE FILTERING LENSES

En Masse Protection

Indoor

Outdoor

OLP Lenses

Frequently visible through polarizing sunglasses are rainbow-like patterns caused by color-dependent birefringent effects. With BluTech Lenses, the view through the automobile windshield would be clear with no color distortion.
Questions