Are We What We Eat?
General Nutrition
Nutrition and the Eye

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Our Agenda
- A Look At An American Epidemic
- What is Complimentary Alternative Medicine?
- Review of Basic Nutrition
- Macronutrients – essential, interesting or total BS?
- Nutrition and Ocular Disease

Obesity - THE American Epidemic
- 2008 – per United States Surgeon General
  “obesity is the fastest growing health epidemic in the United States”
- The second most prevalent modifiable risk factor for death (second only to smoking)

Obesity
The World’s New Epidemic

McDonald’s Hits Africa

The Cost of Obesity
- From 1987–2001, 10–27% of all health care dollars used to treat obesity related disease – and that percentage is increasing yearly.
  2010 projection – 36%!
- CDC estimates – average obese person spends/costs 3X more than non-obese person on health care expenses
- Total expenditures on obese related disease in America 2008
  $147 BILLION

2005 Incidence Data – USA
- Adults 60% overweight
  39% obese
- Children 15% obese (tripled over the past 30 years)
  30% in Hispanics and Blacks
Obesity and Children – *But My Kid Isn't Fat***!!

- **Maybe not on the outside**
- Adipose hypertrophy (swelling of fat cells) is the result of high, poor quality carbohydrate intake and consumption of fake sugars. These fat cells LOVE to congregate around organs and in the belly – the WORST areas to have fat
- Adipose hypertrophy does NOT go away – they just sit – wanting and waiting to be filled with slimy, unhealthy, lipids – especially the really bad ones (more later)

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**January 2010**

*American Journal of Preventative Medicine*
February 2010

“Obesity now poses as great a threat to Americans’ quality of life as smoking”

**Change in Habits: 1993–2009**

<table>
<thead>
<tr>
<th>Smoking</th>
<th>Decreased 18.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity</td>
<td>Increased 85%</td>
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</tbody>
</table>

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**Defining Obesity**

- Body Mass Index (BMI=weight(lbs)/height(in)^2 x 703)
  - BMI > 25    Overweight
  - BMI > 30    Obese
  - BMI > 35    Severely obese
  - BMI > 40    Morbidly obese
- Waist Circumference
  - Men > 40 inches
  - Women > 35 inches
- Visceral Adipose Tissue (VAT)
  - The really accurate way but can only be determined by special MRI study

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**Possibly a Better Way to Decide**

- Get naked – look in the mirror. Do you like what you see?
- Do you get compliments on your appearance?
- How’s your sex life?
- Can you exercise hard for thirty minutes and not feel like end of the world is nigh?

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**Obesity and the Unholy Triumvirate**

- Inflammation
  - Endothelial dysfunction
  - Insulin resistance
- Hypertension
  - Obesity and BMI directly proportional to incidence of hypertension
- Hypoxia
  - Overall poor tissue perfusion
  - Increased blood pressure
  - High correlation with Obstructive Sleep Apnea Syndrome (OSAS)
Obesity and Systemic Disease

- Diabetes
- Heart disease
- Sleep apnea
- Acid reflux
- Gout
- Hepatic disorders
- Depression
- Dementia

And the list goes on and on and on and on….

Obesity and Ocular Health

- Vascular occlusive disease
- Hypertensive retinopathy
- Diabetic retinopathy
- Exudative retinopathy
- Pseudotumor
- Glaucoma
- AMD
- Cataracts

Obesity and Ocular Health

**Cataract**
- Obese have 36% increase in incidence at any age
- PSC 2X greater if BMI >30
- PSC 4X greater in diabetics

**Glaucoma, NAION, Pseudotumor**
- Prevalence glaucoma 27% in OSAS
- Higher IOP in obese
- OSAS most frequent disorder associated with NAION
- Known historical association with pseudotumor

Obesity and Ocular Health

**ARMD**
- 5% increased risk with every 1 point above a BMI of 30
- Increased BMI increases risk of conversion
- Waist circumference related to macular pigment density

**Diabetic Retinopathy**
- “Diabesity” – primary risk factor for T2I DM
- Risk of microvascular disease directly related to increasing glucose resistance

Obesity & Retinopathy

- *Retinopathy occurs in 7% of pre-diabetics who are overweight*
- Remember…retinopathy is not an insulin problem so a risk in ANY diabetic at ANY time. The retina does not require insulin to get glucose into cells. But higher levels of circulating glucose cause the release of reactive oxidative species, resultant chronic inflammation, and eventual breakdown of vascular endothelium

Complimentary Alternative Medicine (CAM)

- Involves consideration of non-traditional treatments, herbs/potions/tinctures, supplements/macronutrients
- Dictates a change in lifestyle
- Has been around >5000 years longer than allopathic medicine
- When compared to “accepted” pharmaceuticals and treatments, have a paucity of side effects
- Widely utilized and accepted worldwide, excluding good ‘ole USA
CAM – may be good, but...

- Not taught in traditional health care curriculum
- Not used in any hospital setting
- Generally scoffed at by practicing MD physicians
- Not reimbursed by medical insurance

\textbf{AT LEAST IN AMERICA, BUT COMMON PRACTICE IN THE REST OF THE WORLD}

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**But…What Do Your Patients Think About CAM?**

In 2002...

- **85%**
  - Number that used some form of non-traditional pharmaceutical application
- **76%**
  - Number that at some level routinely self-administer macronutrient therapy
- **39%**
  - Number that admitted to using macronutrient therapy to their physician

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**Some Nutritional Myths**

\textbf{CAM nutrients are proven to work}

Define work. No nutritional or CAM cure for any of the common, chronic diseases of the masses. How many traditional drugs work/cure? (NOTE: Macronutrients cannot make any claim of treatment or cure, or they are defined as legend drugs and fall under regulation of FDA! \textbf{And doctors!})

\textbf{CAM nutrients are not drugs}

CAM nutrients produce physiological or functional change in tissue – by definition, they are drugs

\textbf{CAM nutrients are not regulated}

Some oversight but no FDA studies to establish safety or efficacy

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**Review of Basic Nutrition**

\textbf{It’s Pretty Basic}

- Fats
- Carbohydrates
- Proteins
- Macronutrients

OR IS IT…YOU CAN DECIDE LATER
Basics of Fats

Three Types

- Saturated Fats
- Unsaturated Fats
  - Monosaturated Fats
  - Polyunsaturated Fats
- Fake Fats (also known as Trans Fats)

Saturated Fatty Acids (SFA)

- Three types – lauric, palmitic, stearic – all bad
- Found in fatty meat, lamb, pork, poultry skin, lard, butter, palm oil, coconut oil, processed dairy products
- Unquestionably linked to cardiovascular disease
- SFA >10% of total daily calories increases LDL and insulin resistance

Moderation!!!

While we’re at it, what does saturated mean?

Saturation refers to the number of double bonds present in the molecule.

The more open double bonds, the more “unsaturated”. Unsaturated fats are more flexible and mobile – less likely to stick or hang up in places they shouldn’t be.

TOTAL CHO
398

Triglyceride
512 mg/dL

A few clarifications....

- Cholesterol does not make you fat – SFAs and trans fat make you fat
- Cholesterol does not cause plaques – inflammation from SFA and trans fat metabolism erodes vessel endothelium creating ulcerations – then cholesterol sticks to the ulcerations

Unsaturated Fats
Monounsaturated Fatty Acids (MUFA)

- Found in most oils, nuts, avocados
- Decrease LDL with no effect on HDL
- Decrease C–reactive protein levels
- Improve health of vascular endothelial cells by decreasing activity of inflammatory adhesion molecules
Unsaturated Fats
Polyunsaturated Fatty Acids (PUFA)

- Found in walnuts, sunflower seeds, soybean and soybean oil, corn oil to some degree, diary, some in meat – **main source is fatty fish**
- These are the “essential fatty acids” – EFAs or Omegas (3,6,9,12…etc)
- “Essential” because:
  - Body cannot produce them
  - You will ultimately DIE without them

Unsaturated Fats
Polyunsaturated Fatty Acids (PUFA)

**What EFAs Do For You**

- Stabilize membrane function (cellular transport)
- Facilitate movement of cholesterol through cells
- Precursors to molecules that regulate platelet aggregation, vascular regulation, and brain development

Unsaturated Fats
Polyunsaturated Fatty Acids (PUFA)

**Main Thing EFAs Do For You**

**EFAs are the among the most potent body anti–inflammatory and free radical scavengers that exist**

Unsaturated Fats
Polyunsaturated Fatty Acids (PUFA)

**MANY PUFAs but the main two are:**

- **OMEGA–6**
- **OMEGA–3**

Polyunsaturated Fatty Acids (PUFA)
Omega–6

- Found in diary, meat (esp. grass fed)
- Break down into two prostaglandins
  - PGE1 (ANTI–inflammatory, anti–pain, anti–clotting, vasodilation)
  - PGE2 (PRO–inflammatory, pro–clotting, vaso–constriction)

Polyunsaturated Fatty Acids (PUFA)
Omega–6: Main Two

**Gammalinoleic Acid (GLA)**

- Reduce neoplastic growth
- Decrease insulin resistance
- Promote healthy skin gland function
- Promote healthy joint function

**Conjugated Linoleic Acid (CLA)**

- Reduce neoplastic growth
- Assist in immune modulation
- Promote bone mineralization
- Decrease hyperglycemia
What about CLA and Weight Loss?

**PRO**
- It works like a bandit!!!

**CONS**
- Increases insulin resistance (can decrease effect if combined with leptin)
- Big problem. By-product of break down is arachadonic acid (one of the most significant body pro-inflammatory mediators)

And what about TRANS FAT

- Chemically, trans fat is a manmade omega-6
- Conjugated chains of isomers of hydrogenated (pumped full of air) vegetable oils
- Biochemically trans fat is poison
- Like artificial sweeteners (more later), the body has no idea what to do with trans fat
- Since they are not metabolized well, they end up stored as pure fat or, even worse, broken down into pro-inflammatory, pro-oxidative free radicals

What Does TRANS FAT Do For You?

- Lowers HDL, increases LDL
- Main problem – significant inflammatory mediator in vascular tissue
- Estimated that elimination of all trans fat from American diet would decrease the incidence of heart disease by 20% (only smoking has higher association)

So why is trans fat still around?

Three Main Reasons

- It promotes a better appearing food product
- It tastes great
- But mainly, it’s CHEAP

Where Do We Find Trans Fat?

- Fried foods
- Pastries
- Cookies
- Crackers
- Margarine
- Shortening

- Bottom line…trans fat will make you hypertensive, ulcerate your arteries, make you obese and ultimately kill you.

End of Story.

But Trans Fat is Old News – Right? Isn’t Everything FAT FREE now?

- No evidence the body has any idea what to do biologically with synthetic fats
- Highest increased incidence in obesity since the introduction of FAT FREE products
- Some research ties some of the chemicals that are used to “eliminate” fats have been associated with higher incidence of intestinal and colon cancer
Polyunsaturated Fatty Acids (PUFA)
Omega-3: Are They Wonder Drugs?

- Beneficial effects too numerous to list
- Mainly function as significant anti-inflammatory mediators
- Protect neurologic tissue
- Regulate omega-6 metabolism (decrease their bad effects)

Omega-3 break down to PGE3, one of most potent anti-inflammatory prostaglandins found in the body
- Two biologically active omega-3s are:
  - DHA (docosahexaenoic acid)
  - EPA (eicosapentanoic acid)

Main Functions of EPA/DHA

- Significant anti-inflammatory properties
- Decrease insulin resistance
- Decrease accumulation of triglycerides
- Decrease visceral fat accumulation

Where do we get omega-3s?

- Cold water fatty fish (BEST SOURCE!)
- Some monosaturated oils (olive)
- Some nuts (almonds, walnuts)
- Flax oil (but…….)

BUT MOST AUTHORITIES FEEL YOU CANNOT CONSUME SUFFICIENT QUANTITIES OF OMEGA-3 IN YOUR DIET, LEAVING SUPPLEMENTATION THE ONLY ALTERNATIVE

Flax Seed Oil or Fish Oil

<table>
<thead>
<tr>
<th>Flax Seed Oil</th>
<th>Fish Oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha-Linolenic Acid</td>
<td>docosohexaenoic acid (DHA)</td>
</tr>
<tr>
<td>Vitamin B6</td>
<td>Vitamin C</td>
</tr>
<tr>
<td>Magnesium</td>
<td>eicosapentanoic acid (EPA)</td>
</tr>
<tr>
<td>docosohexaenoic acid (DHA)</td>
<td>(20% yield max)</td>
</tr>
<tr>
<td>eicosapentanoic acid (EPA)</td>
<td>(Close to 100% yield)</td>
</tr>
</tbody>
</table>

Plus you cannot digest a pecan….

How Much Is Enough?

- Even the FDA, the Holy Grail of bad health information, recommends 1000mg/day for HEALTHY people
- Many recommend 1500–2000mg/day – much higher for disease control (2–4GM)

To achieve these levels of DHA/EPA, you must supplement and become an educated consumer and label reader
And you actually need 3 AND 6

Omega-6
Linoleic Acid (LA)

Omega-3
Alpha-linoleic acid (ALA)

Delta-6 Desaturase

Delta-5 Desaturase

Linoleic Acid (LA)

Eicosatetraenoic acid (ETA)

GLA
Steridonic acid (SDA)

Arachidonic Acid (AA)

Docosohexanoic Acid (DHA)

Gamma Linoleic acid (GLA)

Dihomo-GLA

Dihomo-GLA

Pro-inflammatory for lipoxigenase and cycloxygenase

BLOCKS

Antioxidants for lipoxigenase and cycloxygenase

Thank You AMA....

After decades of stating omega supplementation was a waste of time....

Retail cost for 4gm/day/year $3360.00
Same OTC product at Costco $300.00

And as much as well all hate to hear it, one of the best ways to decrease the bad effects of all fats is a combination of aerobic and steady weight exercise (yuk...)

BUT OMEGAS ARE GREAT!!!

Carbohydrates – Yummy

- Refined sugars
- Fake sugars
- Unrefined sugars

Carbohydrates – Gotta Have ‘Em

Let’s Start By Reviewing Basic Energy Production

Carbohydrates

Glucose

Insufficient Insulin

Glycogen

Fat Storage

Proteins → Amino Acids

Insufficient Glucagon

Insufficient Glucagon

Adequate Glucagon

Adequate Glucagon

Cellular Energy

Glycemic index (GI) is the effect of 50mg of the food on blood glucose levels compared to an standard (glucose) – low is better

Glycemic load (GL) is the measured increase in blood glucose a food produces over time taking into account carbohydrate amounts in the food

Foods with high GI or GL and especially direct intake of fake & refined sugars cause glucose loading which ultimately goes to fat storage

HIGH degrees of individual variability in GI and GL responses but best to consume high GI/GL in moderation

And what exactly is the “glycemic index” & “glycemic load” and do they matter?
**Sugar Bio-utilization**

Unrefined Sugars

**MUCH BETTER THAN**

Refined Sugars

**MUCH BETTER THAN**

Fake Sugars

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**Artificial Sugars**

- You know them as high fructose corn syrup, saccharin, aspartame, sucralose
- Like trans fats, body may have no idea what to do with them
- Estimated to be one of the most significant etiologies behind the swelling Type II diabetes epidemic
- If the body does not recognize these manmade products as a substitute for glucose, the result is:
  - “sugar starvation”
  - insulin resistance
  - decreased insulin made
  - fat storage / diabetes

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**Carbohydrates – Fake Ones**

Watch this...

<table>
<thead>
<tr>
<th>Obesity Incidence 1990 - 2005</th>
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<td>Obesity → Fake Sugar</td>
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**Why????**

- Increase levels of glycogen are stored in adipose tissue causing them to swell (adipose hypertrophy)
- Adipose hypertrophy is very hard to reverse
- Adipose hypertrophy begins in childhood!
- Fake sugars cause adipose hypertrophy!

*That’s why a steady intake of Mac-n-Cheese, DIET drinks, chicken fingers and processed foods has resulted in the highest levels of childhood and adult obesity in history!*

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**Problems with Fake Sugars**

- Increase intravascular oxidative stress
- Impairs vasodilation (promotes ischemia)
- Increase release of free radicals
- Increase release of pro-inflammatory mediators (especially cytokines)
- Increase circulating glucose (remember…fake ones decrease insulin production and increase insulin resistance resulting in reduced glucose conversion)

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**Carbohydrates – Refined Sugars**

- Good ole “pure cane” – white sugar
  - Better than bad – beats fake ones
  - All same problems as fake ones but to less degree
- Complex sugars (mainly from fruits)
  - Same problems but even less
  - Bad effects offset by increase fiber levels that reduce blood glucose
- Alcohol sugars – two-edged sword!
  - Phenols decrease C-reactive protein, increase HDL, decrease LDL
  - In excess increase visceral fat (hence – “beer gut!”)
Unrefined Sugars

- Brown sugar (some), turbinado, honey, molasses
- Yummy yummy – popularity less because they sometimes cost more but mainly because they are less sweet (all about taste conditioning!)
- Human taste buds have become less sensitive to sweet, hence requiring more intense levels of sugaryness (no, not a real word!)

Proteins – The Essential Building Blocks of Life

- Essential to energy production
- Key ingredient in the manufacture of amino acids, hormones, antibodies, and enzymes
- Essential for healthy cell production
- Essential for DNA replication / repair
- Help to maintain the bodies alkaline:acid balance

Two Types of Proteins

- Complete
  - Main proteins the body needs
  - Contain all amino acids
  - Found in meat, chicken, fish, soy
- Incomplete
  - Missing some amino acids
  - Found in grains, legumes, nuts, some vegetables

Can you survive without complete proteins...yes, body can combine other nutrients to make complete proteins – but does require more work on the bodies part

Too Much of a Good Thing?

Results of excess protein consumption

- Promotes insulin resistance
- Increases reactive stress in kidneys
- Increases levels of LDL

All of these are found in less degree with protein from fish and soy

Macronutrients

- Vitamins
- Minerals
- Phytochemicals
- Others

Vitamins – Fat Soluble

**Vitamin A** (broccoli, sweet potatoes, carrots, mango)
Bone growth; reproduction; cell division and differentiation; immune system; vision system (retinol!)

**Vitamin D** (sun, milk, egg yolk, liver, fatty fish)
Organ and bone maintenance; immune system; nerve health *(7 of 10 children deficient per Pediatrics 2008)*

**Vitamin K** (green leafy, liver)
Bone health; blood clotting (contraindicated in patients on blood thinners!)

Minerals

Phytochemicals

Others
**Vitamins – Fat Soluble**

**Vitamin E** (oils, wheat germ, sweet potato)
- Potent antioxidants; vasodilators; many others, but...there are two faces of Vitamin E

**Tocopherol** – Well known but far less potent

**Tocotrienol** – More mobile in cells due to smaller head and shorter tail of the molecule. Tocotrienols have 50X more antioxidant activity plus promote heart health, lower LDL, have angiogenesis activity (AMD and retinopathy benefit!) and inhibit action of UV. Most common sources are monocotyledon nuts, rice and palm oil.

**Vitamins – Water Soluble**

**B1 – Thiamine** (spinach, peas, lean meat, soy)
- Carbohydrate metabolism; vasodilation; optimizes brain function (sig. decrease in optic neuritis)

**B2 – Riboflavin** (spinach, broccoli, mushroom, diary)
- Carbohydrate metabolism; mitochondria metabolism; reduces cataract formation

**B3 – Niacin** (spinach, potato, tomato, meat, tuna)
- Digestive system; increases HDL – reduces LDL; increases circulation

**B5 – Pantothenic acid** (widespread)
- RBC synthesis; nutrient metabolism; precursor to Coenzyme A (mitochondria metabolism)

**B6 – Pyridoxine** (banana, tomato, broccoli, spinach, rice)
- Required for B12 absorption; production of neurotransmitters

**B12 – Cobalmin** (meat, egg, fish)
- Neuron maintenance (decreases common in elderly and vegetarians)

**Folate – Folic acid** (tomato, bean, broccoli, peas, beans)
- DNA production; new cell growth

**Vitamin C** (spinach, peppers, peas, broccoli, fruits)
- Essential in hundreds of body metabolic functions; immune health

**Minerals**

**Calcium** (milk, diary, broccoli, beans)
- Bone/teeth growth; regulated by magnesium

**Magnesium** (spinach, broccoli, beans, peas, tomato)
- Essential in >300 metabolic processes; high levels of zinc will counter magnesium activity

**Zinc** (spinach, broccoli, beans, crustacean, cheese)
- Regulates ATP enzyme; immune system; regulates apoptosis; nerve transmission

**Selenium** (seafood, grains, meat)
- Anti-oxidant; thyroid regulation; assists Vit E in fat metabolism

**Phytochemicals**

**Bioflavinoids**
- Promotes capillary strength; required for body to utilize Vitamin C

**Anthocyanidins**
- Essential to vascular health

**Carotenoids** (lutein, zeaxanthin, lycopene, beta carotene)
- Powerful anti-oxidants

**Proanthocyanidines (resveratrol)**
- Proposed to have anti-inflammatory, antibiotic, anti-aging, anti-cancer, and neuroprotective properties

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And the “Others”

**CoQ10** (fish, organ meat, whole grains)
Promotes better cardiac function; decreases blood sugar; essential part of photoreceptor outer segment metabolism (NOTE: depleted by statins and beta blockers!)

**Taurine** (meat, fish, eggs)
Promotes better vascular endothelial cell function

**Ginger** (duh...)
Powerful antioxidant

**Flavonoids** (bilberry, ginkgo, genistin)
(fruits, berries, beans, tomato)
  Normalize blood vessel permeability; antioxidants

Are macronutrients safe?

- Over the past 23 years, 230 deaths were attributed to nutriceutical use. Over 90% of those were due to one – **EPHEDRA**
- By contrast, aspirin caused 10,000 deaths in men alone over the same period

And remember the safety profile must be proven significantly higher than legend drugs for a medication to go OTC

There are some side effects

- VitA – contraindicated in pregnancy, osteoporosis, and liver disease. Better choice is betacarotene which stays in body and converts to VitA on an “as needed” basis
- But...betacarotene linked to higher incidence of lung cancer in smokers
- VitC – diarrhea in high doses
- B3 – hyperthermia, flushing, palpitations, maculopathy in high doses
- B12 – ON ischemia if used with proton pump inhibitors (used to treat GERD)
- Bleeders – no ginkgo, omega-3, ginseng, papain, echinacea, ginger, St Johns Wort

And Now, Reality and Myths of Nutriceutical Treatment of Eye Disease

Let’s get a few basics out of the way...

- Healthy body, healthy eyes – not guaranteed but bloody good advice
- Nutriceutical supplementation PROBABLY helps general health and likely ocular health, VERY LIKELY causes no problems
- NO nutriceutical offers a cure for anything

ARMD and AREDS: What REALLY Happened

- 4700 patients followed for 6.3 years
- Half given somewhat arbitrary formulation of 500mg VitC, 15mg beta carotene, 2mg copper, and 80mg zinc

RESULTS

- 8% reduction in progression to Category 4
- 19% reduction in vision loss in Category 3 & 4
- Overall 25% reduction in rate of progression

IMPRESSED?

BUT THERE IS PLENTY OF SOUND SCIENTIFIC DATA TO SUPPORT THE WISDOM OF A HEALTHY DIET AND EVEN MORE, NUTRICEUTICAL SUPPLEMENTATION
What AREDS DIDN’T Show

- Did not show reversal of vision loss
- Did not test any prevention of ARMD
- Did not test benefit in early ARMD

Bottom line....

- The AREDS formulation was totally arbitrary
- The less than exciting results do not mean supplementation is not a great idea
- NOTHING can replace bad lifestyle. If you don’t want ARMD – don’t smoke, don’t get cardiovascular disease, and don’t get old

Others Studies?

AREDS II
- Added lutein 10mg, zeazanthin 2mg, omega-3 and took out beta carotene. We’ll see...

TOZAL Study
- Taurine, omega-3, zinc, antioxidants, lutein
- Control lost 1.5 lines while treated showed 57% improved BVA at 6 months (really?)

LAST Study
- Lutein & Antioxidants Supplement Trial
- “Significant” improved in Snellen BVA, contrast and macular pigment density

Other Studies/Data

- One study showed an increase in refined sugar intake directly related to formation of large, soft drusen
- Two studies show a decrease in folic acid related to conversion of dry to wet AMD
- Copper promotes angiogenesis so higher levels could be related to faster progression of AMD
- Several studies show high dose omega-3 may ALONE be more powerful in treating AMD than all other supplements

ARMD and Macular Pigment Fact or Fiction

- Study 1: Decrease in lutein and zeazanthine associated with decreased levels of macular pigment
- Study 2: Supplementation with lutein and zeazanthine increases levels of macular pigment
- Study 3: Smokers have lower levels of macular pigment
- Study 4: Lutein, zeazanthin and high antioxidant food sources associated with 40% reduction in incidence of AMD

And genetic tests.....

- The tests are looking for variants in CFH gene (compliment factor H)
- CFH variants are found in 100% of patients with AMD

BUT

Also found in large % of normal population

- Does test specificity matter when you’re trying to sell a product???

(Ouch!)
### Recommendations?

- Supplement all confirmed AMD and all at risk
- Consider omega-3 as essential
- AREDS vs Non-AREDS? Personally not impressed buy you have to decide
- Advise all AMD risk patients and confirmed diagnosis to STOP SMOKING
- Macular pigment testing/treated? Personally not impressed – as very few are
- If you see a lot of AMD, consider addition of Preferential Hyperacuity Perimeter

### Glaucoma

- It’s just not all about pressure any more (especially NTG)
- Vascular dysregulation, vascular endothelial cell health, ocular perfusion all very important in probably ALL forms of glaucoma
- Anything that increases blood flow and decreases hypoxia beneficial in glaucoma patients

### Bottom line...oxidative stress

Oxidative free radicals circulate around looking for electrons to complete their incomplete shells – rendering the “scavenged” molecules inactive. Anti-oxidants lend electrons to these radicals, rendering them inactive.

That’s just about 75% of the nutrition lecture in one statement.

### Specific Antioxidants

- Ginkgo (in a minute...)
- Melatonin – shown to have neuroprotective actions; anti-inflammatory actions; helps regulate sleep cycles
- Bilberry
- CoenzymeQ
- Things we eat – berries (esp. blueberry, cranberry, acai, pomegranate), tea, chocolate, tomatoes (lycopene), green leafy (esp. kale, spinach, broccoli)

### And the science???

**Most studies done on GINKGO**

- Ginkgo is the most widely prescribed and used supplement in Europe
- Antioxidant that is most active on nerve and brain tissue
- Thought to protect the neuron from ischemia, vasospasm, apoptosis and serum viscosity
- Confirmed increase diastolic blood flow velocity at the optic nerve
- Potentially beneficial in all ON vascular disease especially glaucoma, NAION, optic atrophy

### And don’t forget the wonder drug

**Omega EFA – two mechanisms**

- Potent anti-oxidant properties
- Vascular regulators – aid to assist “re-perfusion” which is postulated to be a deficient mechanism in NTG
Aerobic exercise
Again…stop smoking (nicotine binds hemoglobin!)
Get OSAS treated!
Lose weight
Supplement with omega-3 (2gm/day)
Supplement with ginkgo (minimum 120mg/day)
Supplement with antioxidants
Consider products like ScienceBasedHealth.com – Optic Nerve Formula

Glaucoma – Recommendations?

Dry Eyes – Magic of Omegas
Research and results too numerous to mention, but…

- 85% showed RESOLUTION of symptoms
- Significant decrease use of AT
- Increase CL tolerance
- Improved post-LASIK comfort
- Reduced meibomian dysfunction
- Decreased symptoms in Rosacea patients

How do they work? Two ways!

Stabilize Viscosity of Tear Film
*Current dry eye management is ALL ABOUT enhancing tear viscosity*

Decrease Inflammation
*Current dry eye management is ALL ABOUT decreasing inflammation*

How much, how often

- The how much is easy – 1500 to 2000mg of DHA/EPA daily (more if severe)
- How often I offer no answer other than pharmacokinetic common sense (recommend twice daily and taken with food)

And those “special” dry eye formulations….still have to read label

- HydroEye (ScienceBasedHealth) contains VERY little EPA/DHA – lots of GLA but less evidence GLA is beneficial
By comparison….

- TheraTears Nutrient has 750mg EPA/DHA PLUS another 1000mg Flaxseed Oil – retail not a bad buy!! Good consideration for in-house supply

Thanks for your attention