

# Visions2016

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No COI

A major goal of our nutritional research endeavors is to slow the progressive loss of visual function and preserve usable sight until a reliable treatment or cure is found for your disease.

Although you may not qualify for various clinical trials, you can do your part by controlling your diet and nutrition; you may slow the progression of your disease.

Biological variability...

- Same gene mutation...different disease severities
- Members of the same family with same gene mutation
  - Disease progression varies
- Gene modifiers
- Environment (e.g., smoking, sunlight)
- Diet
  - Influence gene expression
  - Different metabolic rates
  - Process nutrients differently

## Retina Nutrition Resources

- FFB web pages:
  - (<http://www.blindness.org/blog/index.php/what-everyone-with-a-retinal-disease-should-know-about-vitamin-a/>)
  - (<http://www.blindness.org/sites/default/files/pages/pdfs/Vitamin-A-Packet.pdf>)
  - Eye on the Cure Blog
  - <http://www.blindness.org/research-news>
- Retina Foundation of the Southwest web pages (Resources):
  - [http://retinafoundation.org/resources/#additional\\_info](http://retinafoundation.org/resources/#additional_info)
- In the US, the Recommended Daily Intake for nutrients is determined by the USDA.

- Sufficient to meet the requirements of **98% of healthy individuals**.
  - <http://www.health.gov/dietaryguidelines/2015-scientific-report/>
- Those with Retinal Degenerations fit that 2%
  - In general “what’s good for your heart, is good for your eyes.”
    - 1) fruits (berries), vegetables, kale & collard greens
    - 2) healthy oils (soy, canola, olive...low  $\omega 6$ , high  $\omega 3$ );
    - 3) eat fish at least twice a week;
    - 4) for the healthy individual, a balanced diet is the key.

Typical WESTERN DIET: fast food, junk food, packaged foods, snacks, & is low in fruits, vegetables, grains, seafood, & poultry.

- favors  $\omega 6$  fatty acid
- $\omega 6$  (pro-inflammatory) &  $\omega 3$  fatty acids (anti-inflammatory)
  - Assess  $\omega 6/\omega 3$  balance
    - RBC fatty acid profiles... index of body’s status
    - OmegaQuant (<http://www.omegaquant.com/faq-for-omega-3-index/>)...DRH has no COI.
    - $\omega 6$  &  $\omega 3$  fatty acids in foods on RFSW webpage.

Lifestyle changes: sunglasses, exercising, & smoking.

- Disclaimer: consult physician or ophthalmologist about foods & supplements; identify any to avoid.
- FOR RP: 15,000 IU/day Vitamin A palmitate, 1-2 servings cold-water fish /week (salmon, tuna, mackerel, halibut, herring, or sardines) containing DHA or supplement 200 mg DHA / day and 12 mg lutein
- Yearly blood liver function tests
- Avoid 400 IU Vitamin E SUPPLEMENTATION; ~40 IU is fine

### **Stargardt’s disease**

- Patients with AbcA4 gene mutation avoid Vitamin A SUPPLEMENTATION

- Genotyping for patients with clinical characteristics of macular degeneration (Best Disease, Cone-Rod Dystrophy, early AMD)
- Some patients with recessive RP have AbcA4 gene mutation.

### **Age-related Macular Degeneration (AMD)**

- Slow risk of AMD progression:
- 400 I.U. Vitamin E, 10 mg lutein, 2 mg zeaxanthin, 500 mg Vitamin C, 80 mg Zinc oxide, 2 mg Cupric oxide.
- AMD Patients who SMOKE should avoid beta-carotene

### **Western Diet**

- Goal is to prolong shelf-life of foods and increase profits by reducing healthy ingredients such ESSENTIAL FATTY ACIDS.
- These GOOD FATS are polyunsaturates needed for important structural & functional roles but are susceptible to oxidation so manufacturers eliminate the polyunsaturates from their foods.
- Oils rich in  $\omega 6$  fatty acids used for cooking and are overloaded Western Diet with  $\omega 6$ .
- Dietary ratio of  $\omega 6$  to  $\omega 3$  in our foods in US is 16-to-1 vs  $\omega 6/\omega 3$  ratio in Japan of 4:1; target is 2:1.
- The Japanese consume about 25 oz of fish per week compared to an average of 5 oz per week in the US.

### **Natural sources of Omega-3 Fatty Acids:**

- $\alpha$ -Linolenic acid (ALA) is an ESSENTIAL FATTY ACID as the body cannot make the  $\omega 3$  bond.
  - About 1% is converted to biologically active EPA and DHA
- ALA in soybean oil, canola oil, walnuts, flaxseeds & chia seeds
- US Dietary Reference Intake for ALA is 1.1 g/day (women); 1.6 g ALA/day (men)
  - $\sim 1/2$  oz/day English & black walnuts;  $\sim 1/4$  tablespoon/day flaxseed oil;  $\sim 6$  oz/day olive oil

## **Dietary Long-chain $\omega$ 3 polyunsaturated fatty acids:**

- EPA and DHA enriched in salmon, tuna, mackerel, rainbow trout, herring, halibut, & sardines.
- Fish consume algae that make the  $\omega$ 3 fatty acids.
- DHA is highly enriched cell membranes of our brain & retina
- For a list of DHA in Foods (see RFSW webpage)

## **DHA Recommendations of Expert Panels**

For healthy adults:

- 500 mg DHA & EPA/day Acad of Nutri & Dietetics & ISSFAL
- 250 mg DHA/day WHO & EFSA
  - (Deckelbaum et al. Am J Clin Nutr 2008)

## **Average Daily Intake of DHA in the US:**

- 70 mg DHA per day (and 35 mg EPA)
- Compared to 620 mg DHA/day in Japan (also 360 mg EPA/d)
  - (Suzuki et al. 2004 Br J Cancer).

## **Recommendations for Fish Consumption**

- 2 fish meals per week (cold water, fatty fish) to potentially achieve an intake of 500 mg DHA+EPA per day
  - (<http://www.ajcn.org/cgi/reprint/83/6/S1526.pdf> )
- Mercury in Fish (see RFSW webpage)
- **Farmed vs Wild Salmon:**
  - Farmed: more fat, more saturated fat but more  $\omega$ 3. Wild salmon...fewer calories. Toss up.
  - Farmed: more organic pollutants & antibiotics. Wild salmon may have more mercury.
  - Best bet for nutritional value: Wild salmon.

## Sources of DHA (& EPA) Supplements to Consider (DRH has no COI):

Fish oil, liquid and capsules:

- “Carlson” is a quality brand
- Nordic Naturals “Ultimate Omega Xtra” is a liquid with 2000 mg EPA and 1000 mg DHA per teaspoon (relatively decent taste!)
- DSM Nutritional Products: brand name is “LifesDHA” (was Martek) algal DHA oil...It typically provides 200 mg DHA per 500 mg capsule. Used in Berson and RFSW clinical trials
- “OmegaVia” produces high quality, concentrated, cost-effective DHA and EPA capsules

## From the Literature: DHA supplementation in X-linked RP Trial

4-year randomized, placebo-controlled clinical trial with 30 mg DHA/kg bodyweight/day with 60 participants with early-stage XLRP

- Participants received btwn 600 and 3600 mg DHA/day
- Increased DHA from 3% to 10% of total RBC fatty acids
- Did not improve cone ERG function or visual acuity
- At 30 mg/kg/day, the loss of visual field sensitivity was reduced by 55% ( $p < 0.0001$ )
- At 17% RBC-DHA, the loss of field sensitivity may be completely eliminated (45 mg DHA/kg/day)...CAUTION these are extrapolated results.

**Safety:** 30 mg/kg/d x 4 years with XLRP minimum adverse events (intolerable in one participant with Crohn’s disease)

- X-linked Rett syndrome study using 70mg DHA+120mg EPA/kg/d x 12 months, no adverse events.

Publications: Primary outcome: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4795002/>

Safety: <http://iovs.arvojournals.org/article.aspx?articleid=2128909>

Visual Fields: <http://iovs.arvojournals.org/article.aspx?articleid=2463757>

**Lutein, Zeaxanthin, & mezo-Zeaxanthin:** <http://www.aoa.org/patients-and-public/caring-for-your-vision/diet-and-nutrition/lutein?sso=y>

- Ratio of 1:1:1 of L:Z:mZ optimizes neuroprotection in the retina
- Antioxidants scavenge free radicals generated by BLUE light
- Lutein per cup (kale=24mg, spinach=20mg, collard greens=15mg, & turnip greens=12mg)
- L, Z & mZ in natural food sources; greater bioavailability

## From the Literature:

- Correlations were found for lutein intake, macular pigment optical density & improved visual function (meta-analysis of 1176 patients; 20 mg L / day) (Liu et al IOVS 2014)
- Correlations found for serum lutein and cognitive function (Kelly et al. J Alzheimers Dis. 2015)... currently CREST trials in Ireland with 10mg L / 2mg Z / 10mg mZ/day x 12 months
- Clinical Trial RESULTS: 40 mg L / day x 9 wks then 20 mg L / day x 17 wks... improved visual fields of participants with retinal degenerations, p=0.038 (Dagnalie et al. Optometry 2000)

## Antioxidants & Neuroprotectants:

- Saffron (Italian species) improved ERG function in patients with early AMD (Bisti et al. Vis Neurosci 2014)
  - N-Acetyl Cysteine Amide (NACA): potent antioxidant, anti-inflammatory, anti-apoptosis (cell death;human cell cultures)
  - Bilberry extract (anthocyanins inhibited apoptosis in rabbit model; Wang et al. Molecules 2015)
  - Curcumin (turmeric; spice of the ginger family) neuroprotection in animal models of Alzheimer's & RP
  - Grape extract preserved retinal function after oxidative stress in mice (Patel et al. Nutrition 2016)
- Table of Antioxidants in 3100 Foods (M Carlsen et al 2010)
  - <http://www.biomedcentral.com/content/supplementary/1475-2891-9-3-S1.PDF>
    - Japanese green tea =1347 mmol /100g (3 oz)
    - Sangre de Grado (S. Am Dragon's blood) =2897
    - Pomegranate = 55
    - Green mint leaves = 142
    - Bilberries = 8 to 48
    - Grape seed extract = 216

## Anti-inflammatory actions of $\omega$ 3 FAs

- DHA & EPA metabolized to neuroprotectins & recoverins
- Anti-oxidant, Anti-apoptotic, Anti-inflammatory