



  
**BioAstin<sup>®</sup>**  
NATURAL ASTAXANTHIN  
Nature's Anti-Inflammatory<sup>™</sup>

**Cyanotech**

# Cyanotech Corporation

- Specializing in Microalgae Technology
- Operating since 1984
- 70+ Employees
- ISO 9001 Certified
- Non-GMO, environmentally friendly products
- Public Company:  
NASDAQ:CYAN



Keahole Point, Hawaii

# Cyanotech

*The World's Premier  
Algae Production Facility*

- ◆ Largest Microalgae Farm in the World
- ◆ Eighty Five Culture Ponds
- ◆ 45 Hectares



# All products from microalgae

- BioAstin® Natural Astaxanthin
- Hawaiian Spirulina Pacifica®
- NatuRose® Feed Additive
- Aquabest™ Feed Additive
- Medical diagnostic dyes



# Supplying Hawaiian Spirulina Pacifica for over 20 years



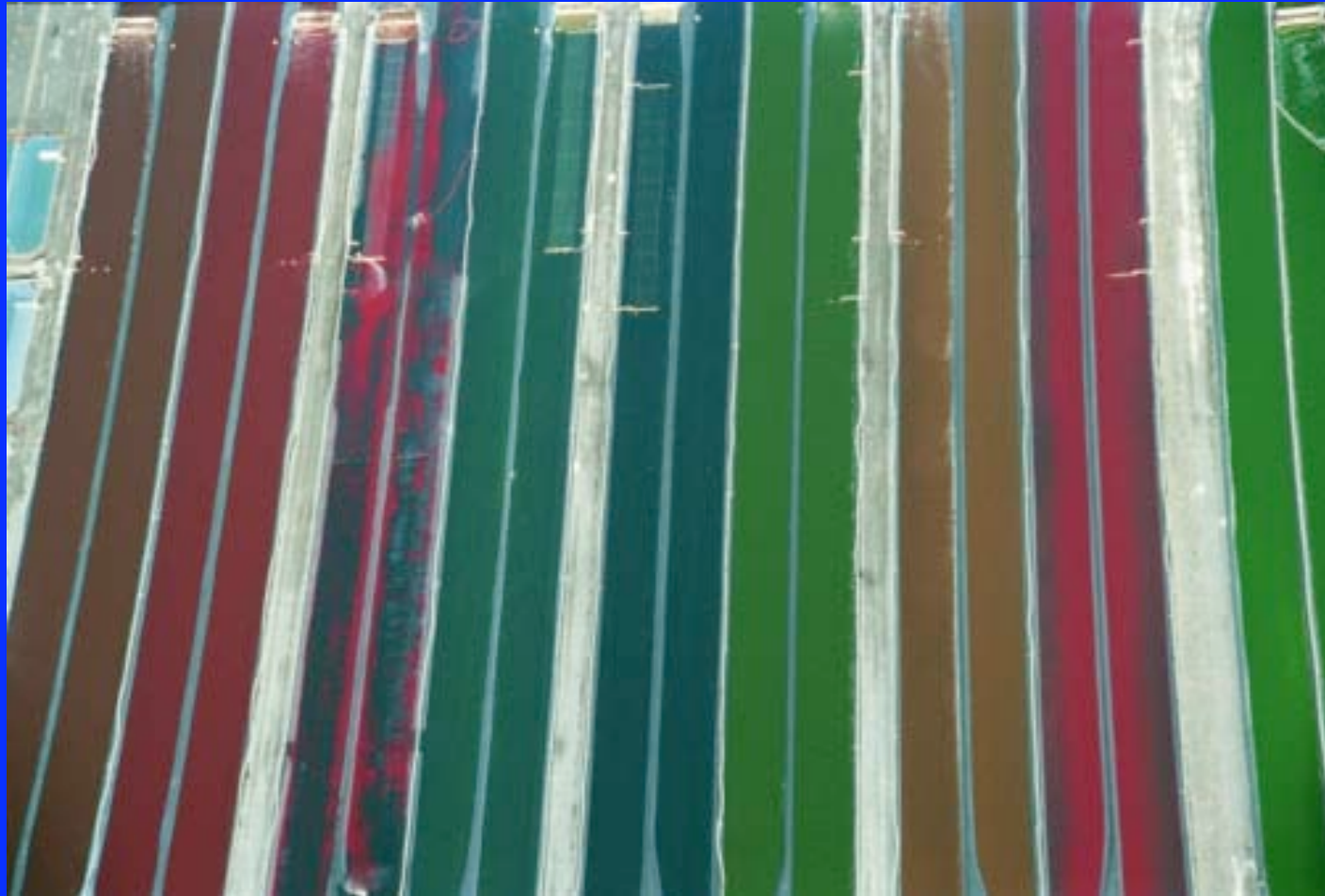


Paddlewheels stir shallow ponds (20 cm depth)  
Ponds are 90 meters long and 35 meters across

A clean environment for a pure product: Kona, Hawaii is blessed with clear skies and clean water



BioAstin® is extracted from *Haematococcus Pluvialis* Microalgae



*Haematococcus* ponds turn from green to red like fall leaves





Pond at harvest density (6 – 8 day cycle)

BioAstin® is *natural* Astaxanthin, a deep red carotenoid complex produced by the microalgae *Haematococcus pluvialis*.

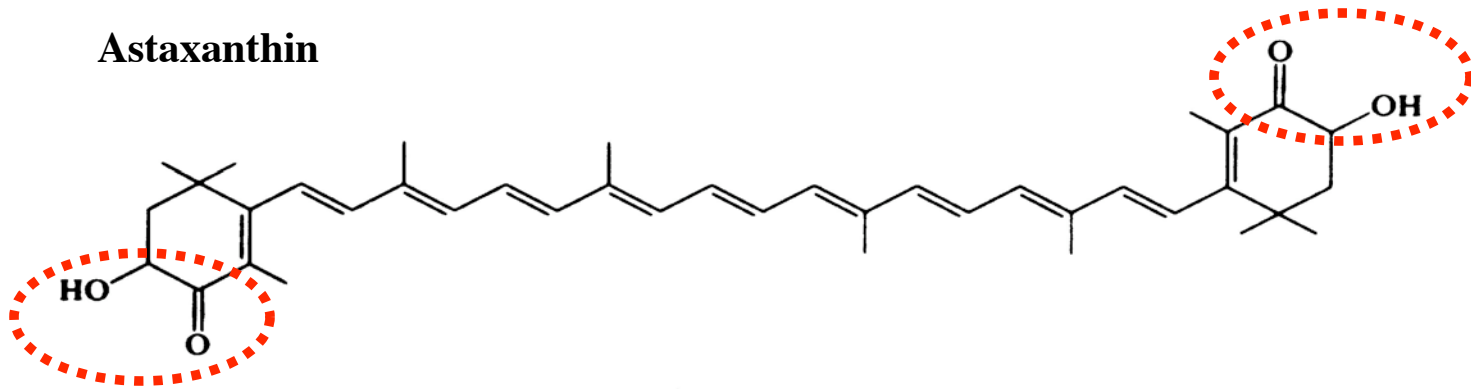
Astaxanthin is found in foods such as salmon, lobster and shrimp.

Microalgae is nature's richest source.

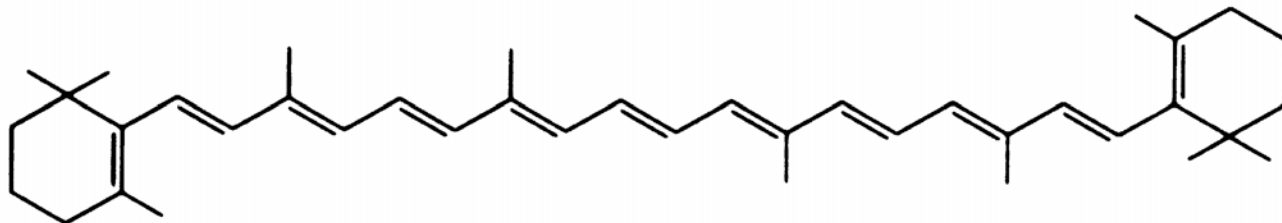


Structural similarity to beta-carotene,  
but strong functional difference

**Astaxanthin**

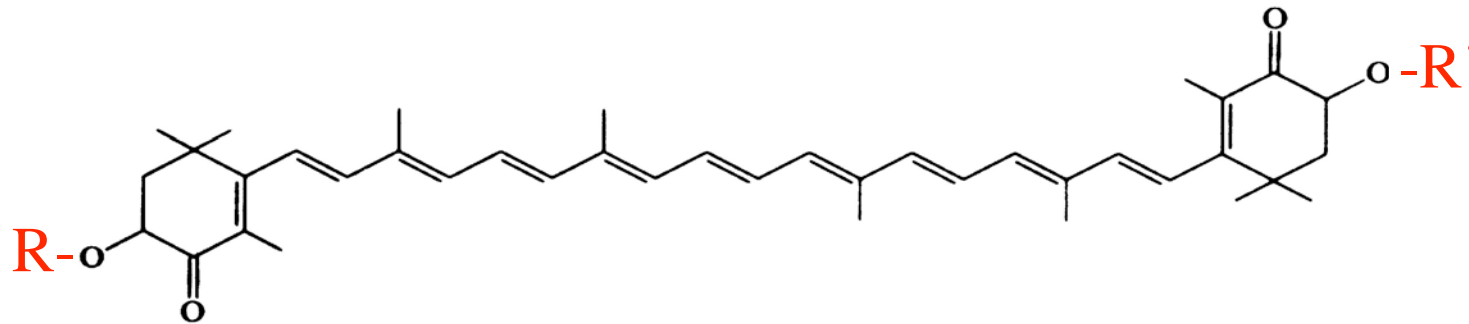


**$\beta$ -Carotene**



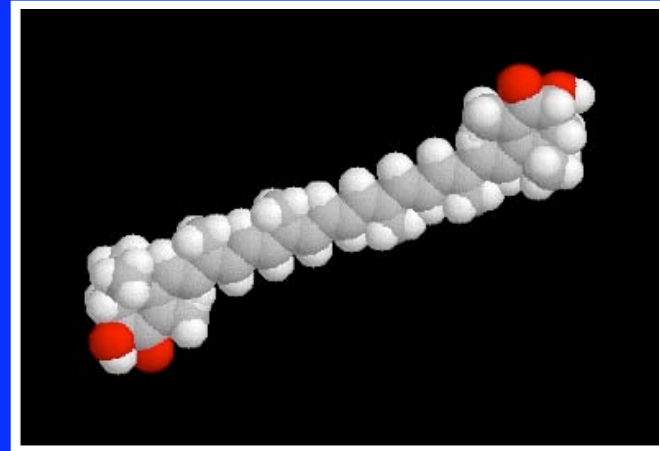
R- bonds occur in natural astaxanthin when one or more fatty acids or peptides are attached to the molecule.

**Astaxanthin**



*Unique chemistry of natural astaxanthin allows spanning of cell membranes, crossing blood-brain barrier, and bonding directly with muscle tissue. Beta-carotene and lycopene do not have these bonding sites.*

# The unusual chemistry of natural astaxanthin



- All natural form complexed with fatty acid
- Carotenoid fraction is 95% astaxanthin with the rest lutein, b-carotene and canthaxanthin

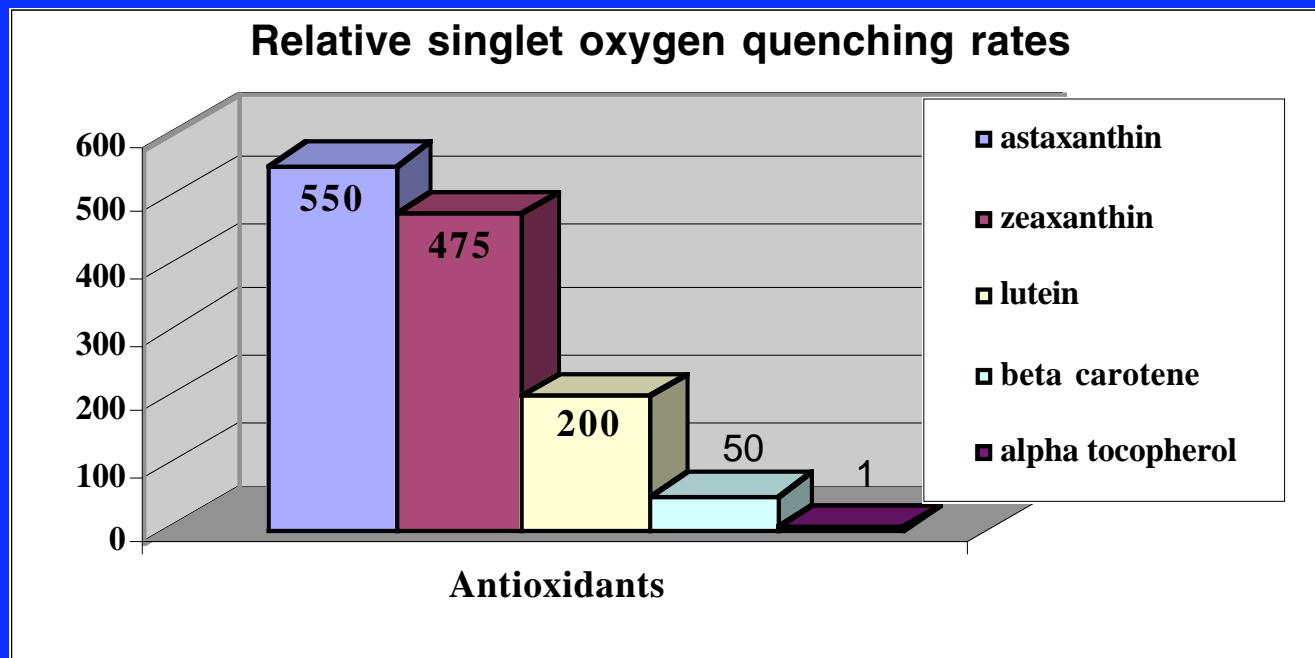
# Astaxanthin Research

1. World's Strongest Antioxidant
2. Excellent Anti-inflammatory
3. Rheumatoid Arthritis
4. Carpal Tunnel Syndrome  
(Repetitive Stress Injury)
5. C-reactive protein
6. Tennis elbow (tendonitis)
7. Internal Sunscreen
8. Prevents joint and muscle soreness after exercise. Improves exercise recovery
9. Immune System Enhancer
10. Brain and Central Nervous System
11. Macular Degeneration and Visual Acuity
12. Blood Lipids and Cholesterol
13. Skin and Beauty Applications
14. Ulcers, Cold and Canker Sores
15. Strength and Endurance
16. Improves Semen Quality in Infertile Men
17. Inhibits Carcinogenesis (animal studies)



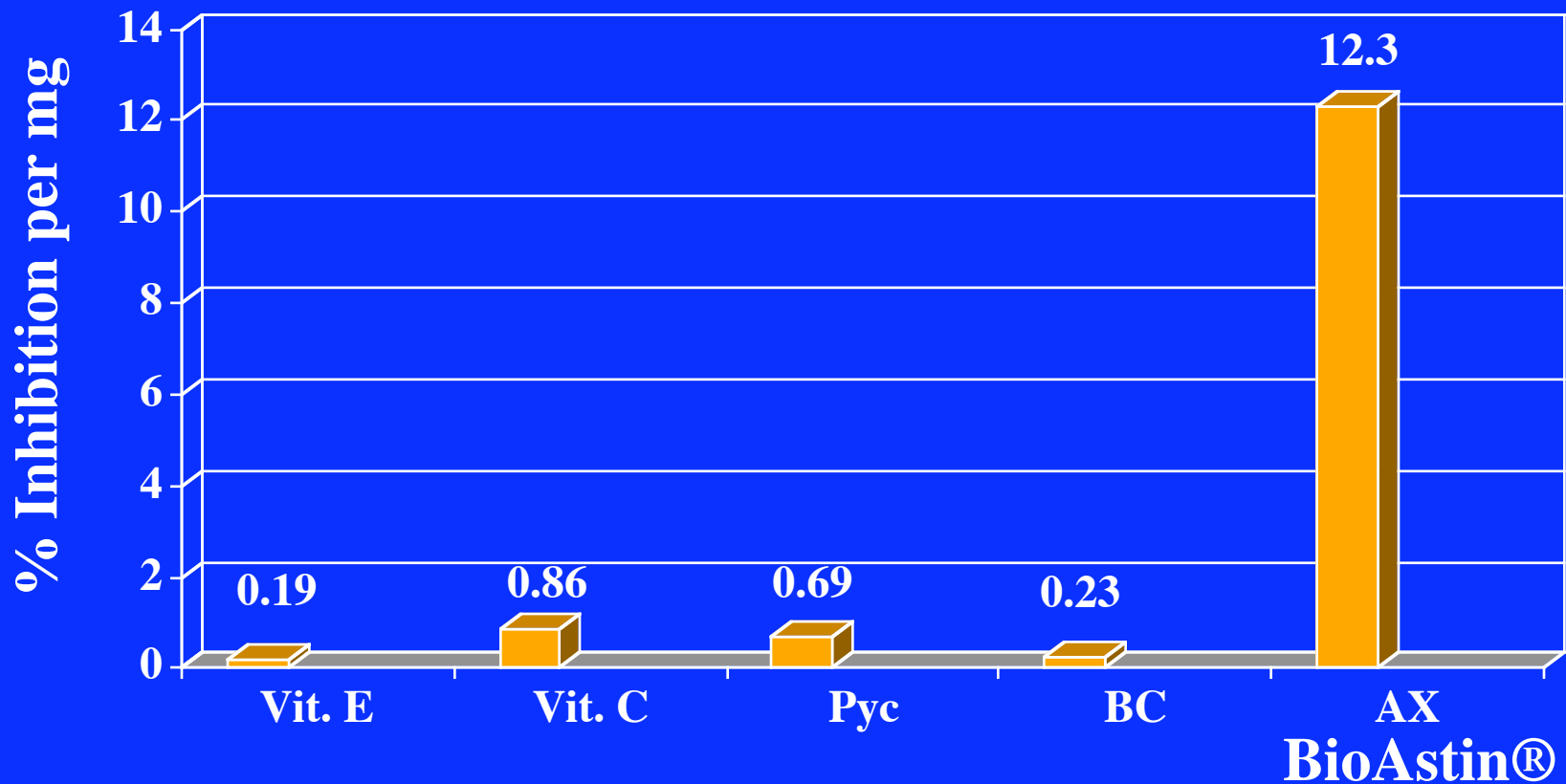
# BioAstin® is exceptionally powerful in singlet-oxygen quenching

- 550 times stronger than vitamin E
- 11 times more powerful than beta-carotene





## Oxygen Free Radical Scavenging



From D. Bagchi, Creighton University



# Inflammation

- Scientists believe that inflammation is a major cause of many life-threatening diseases
- Astaxanthin has been shown to be an outstanding anti-inflammatory. It works by multiple pathways by inhibiting 5 leading causes of inflammation:
  1. Prostaglandin E-2
  2. Nitric Oxide
  3. Cox-1 and Cox-2 enzymes
  4. Interleukin 1\_
  5. Tumor Necrosis Factor-A

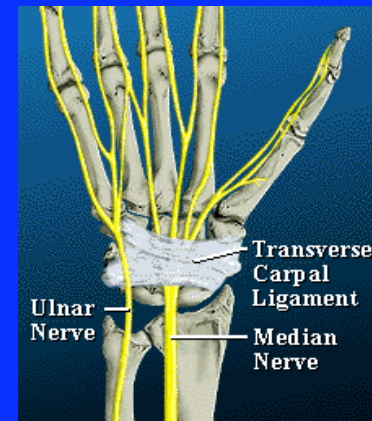
# Rheumatoid Arthritis

- Much more difficult to treat than Osteo-Arthritis
- Double blind, placebo controlled clinical trial showed excellent results with BioAstin®
- Many patients requested the name of the product for future use— noted in clinical results



# Carpal Tunnel Syndrome (Repetitive Stress Injury)

- Approximately 2% of the US Population has CTS
- No Cure: Splints/Surgery only options for most patients
- Positive clinical results: Improvement in mobility and reduction in pain
- Cyanotech holds the US Patent



# C-reactive protein

- American Heart Association claims this is a key indicator of heart disease
- Marker for “silent inflammation”
- BioAstin shown to reduce CRP by over 20% in only 8 weeks
- Statistically significant results

# Tennis Elbow (Tendonitis)

- BioAstin improved grip strength of tennis elbow sufferers by 93% in 8 weeks



# Oral sunscreen clinical results

- Sunburn is an inflammatory condition
- Consumer Testing Lab trial, 4 mg per day for two weeks
- Results show significant increase in the amount of time to redden the skin
- Cyanotech holds the US Patent as an oral and topical sunscreen



# Joint and Muscle Soreness Clinical Results

- University of Memphis Clinical Study
- Double blind / Randomized 60 subjects
- Placebo group showed joint and muscle soreness for 48 hours, experimental group had no soreness
- Improves exercise recovery time



# Immune Enhancement

- Clinical trial at various dosages
- Excellent immune system enhancement at dosages as low as 2 mg per day



# Central Nervous System

- Demonstrated in University of Illinois study to be able to cross the blood brain barrier
- Provides antioxidant protection to the brain and central nervous system
- Most carotenoids and antioxidants cannot effectively cross the blood brain barrier



# Eyes and Astaxanthin

- Macular degeneration (Univ. of Illinois study and patent)
- Protects eyes from light-induced damage
- Improvement in visual acuity (Japanese study)
- Improvement in eye strain (Japanese studies)



# Blood Lipids and Cholesterol

- Studies done in Japan and Eastern Europe
- Eastern European study: 30 male subjects with high cholesterol and triglycerides
- 4 mg per day for 30 days
- Significant improvement in cholesterol and triglyceride levels

# Skin and Beauty Applications

- Japanese and Canadian Studies
- Significant improvements in:
  - Fine wrinkles
  - Elasticity
  - Moisture levels
  - Smoothness
  - Spots and freckles



# Ulcers, Cold and Canker Sores

- Inflammatory conditions
- Effective in reducing H. Pylori, a bacteria that causes ulcers
- Cold and Canker sore US Patent held by Cyanotech

# Nature's Aquatic Marathon

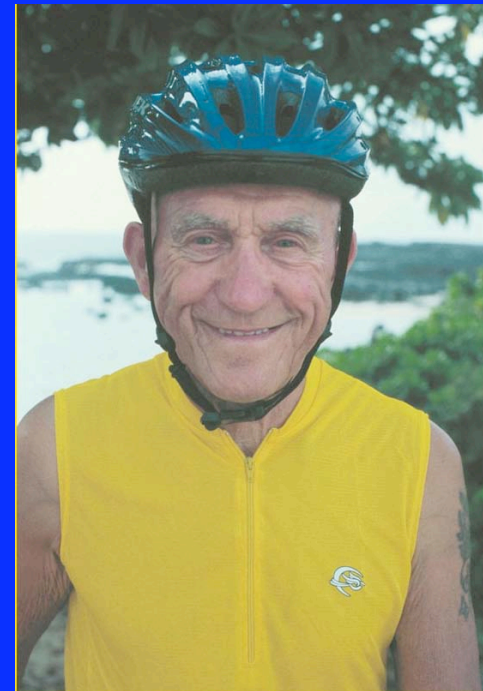
- Salmon studies show the highest concentration of Astaxanthin present in salmon's muscles.
- Scientists theorize that the high levels of Astaxanthin allow salmon to make their heroic upstream swim.



# *Natural Astaxanthin*

## sports applications

- Cyanotech clinical trial users reported increased endurance
- Double-blind human clinical study in Sweden with 40 subjects.
- Significant strength and endurance improvement
  - 4 mg per day for 3 months
  - Experimental group did 62% more deep knee bends
  - Control group did 22% more



Max Burdick, 78 year old triathlete and avid BioAstin® user

# Improvement in Semen Quality in Infertile Men

- Animal studies on boars and stallions
- Human clinical on infertile men
- Three month study, 16 mg per day
- 50% of couples in the experimental group conceived within 3 months vs. only 10% in the control group



# Cancer Deterrence

- No human clinical to date
- Several positive animal and in-vitro studies
- Astaxanthin was shown to inhibit carcinogenesis in separate mammal studies (rodents) in four different organs:
  - Liver
  - Bladder
  - Oral Cavity
  - Colon

# Multiple Product Formats

- Super-critically extracted oleoresin
- Stabilized tablet-grade microencapsulated beadlet
- Softgel capsules
- FDA DSHEA review and toxicity studies completed



*“Mahalo” (thank you) for your attention*

