

innoBio®

Nutritional Solutions for Eye Health

XanGuard® Lutein, DurOmega® DHA and LocVita® Vitamins for vision
and eye health



www.innobioglobal.com

Based in Nature, Full of Health



Eye health across the human lifespan

Importance of eye health

Our eyes are not only the windows to the soul, but also provide us with the most important sensory ability of them all – sight. Almost 50% of our brain is involved in visual processing, and 83% of the information the brain gathers comes via the optic nerves. Vision and visual function vary with age just as our physical performance does. Therefore, eye health issues need different levels of attention at different stages of life.



Eye diseases to pay attention to

0–6 years old – important period for eyesight and visual development

Infants and young children are at the important period of time for eyesight and visual development. The major development of the eyes occurs before the age of 6.

6–18 years old – focus on myopia

The development of the eyeball generally matures around the age of 18. Before it reaches maturity, the eye retains a degree of plasticity which carries with it a heightened risk of myopia. Increased attention should be paid to the prevention of myopia at this stage.



18-35 years old - high incidence of myopia and dry eye

At this time, all parts of the body are mature, and vision is stable. However, it is common to develop myopia after the age of 20 due to repeated strain of the eyes through reading or working. It is worth noting that the incidence of dry eye disease in 18-35 year olds is very high.

35-55 and above 55 years old - age-related macular degeneration (AMD) and cataracts

The function of the eyes gradually deteriorates after the age of 45, and the incidence of fundus diseases increases. For example, cataracts have an incidence rate of up to 80% after the age of 60. Macular degeneration may also lead to blindness, with the initial symptom of partial vision loss.

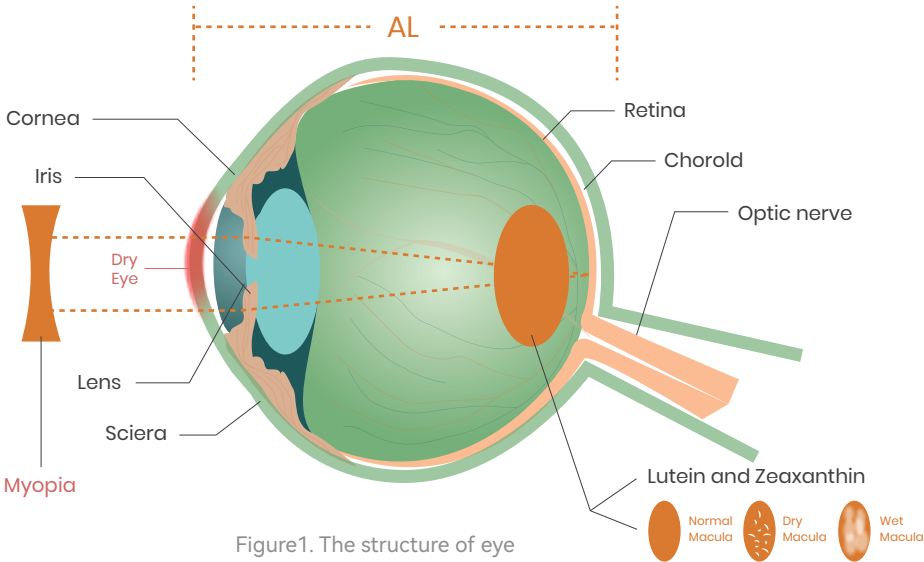


Figure1. The structure of eye

Note:

Myopia, axial length(AL) combined with lower MPOD is associated with risk of myopia.
Dry eye, person doesn't have enough quality tears and eyes turn red.
AMD, a process of degradation and damage occurs to macula. There are two types: dry and wet.

The outlook of eye health and nutrients



Visual Development



140 million / Year
Number of births

Around 140 million babies are born every year in the world. That's more than four births every second of every day¹.

Dietary supplementation with **lutein** and **zeaxanthin** appears to play a significant role at the very earliest stages of retinal embryology and cognition².



DHA may protect against visual development problems, especially in non-breastfed infants³.

A European Food Safety Authority statement suggests that a formula supplemented with at least 0.3% of total FA as DHA improves visual function at 12 months in infants.

0.3% of FA

Myopia



Myopia is a common vision condition that often begins between the ages of **6** and **14**. It is estimated that in 2019 around **2.6 billion** people worldwide have myopia, or nearsightedness⁴.

01

Risk of Myopia

“AL”
Axial Length

Axial length (AL) is the total length of the eyeball from the anterior surface of the cornea to the fovea, which is the sum of the anterior chamber depth, the lens thickness, and the vitreous chamber depth. A longer AL combined with a thinner central retina and lower MPOD is associated with an increased risk and severity of myopia⁴.

02

Control Myopia

“DHA”
ω-3 PUFA

Recently studies suggests ω-3 PUFAs such as DHA are readily available potential candidates for myopia control⁵.

03

Myopia Prevention

“MPOD”
Lutein and Zeaxanthin

Another research study shows that lutein and zeaxanthin can promote hyaluronic acid synthesis, which is shown to be protective against myopia. Lutein also increases macular pigment optical density (MPOD) levels⁶.

Recommended dosage daily: 10mg Lutein, 2mg Zeaxanthin, 300mg Omega-3

Dry eye disease (DED)

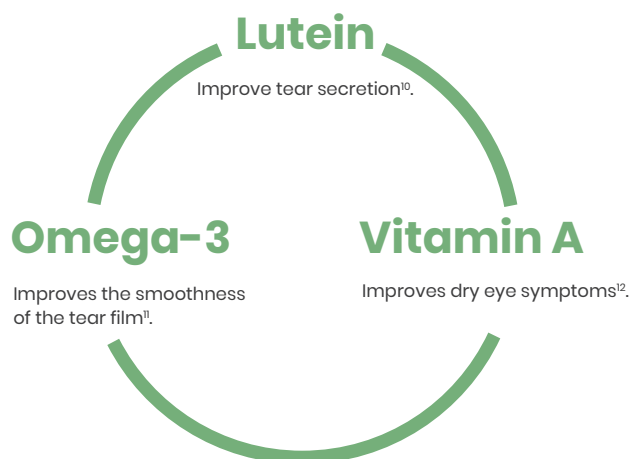


Dry eye disease (DED) is a common condition that occurs when your tears aren't able to provide adequate lubrication for your eyes.



The prevalence of DED ranges globally from 5 to 50 percent⁷. Based on analyzing the data from the National Health and Wellness Survey, 6.8 percent of the United States adult population (approximately 16.4 million people) were projected with diagnosed DED⁸.

Lutein, vitamin A, DHA and balanced nutrition are essential contributors to maintaining healthy eyes along with appropriate management and treatment⁹.



Recommended dosage daily:
10mg Lutein, 5,000 IU VA, 250mg Omega-3

Age-related macular Degeneration (AMD)



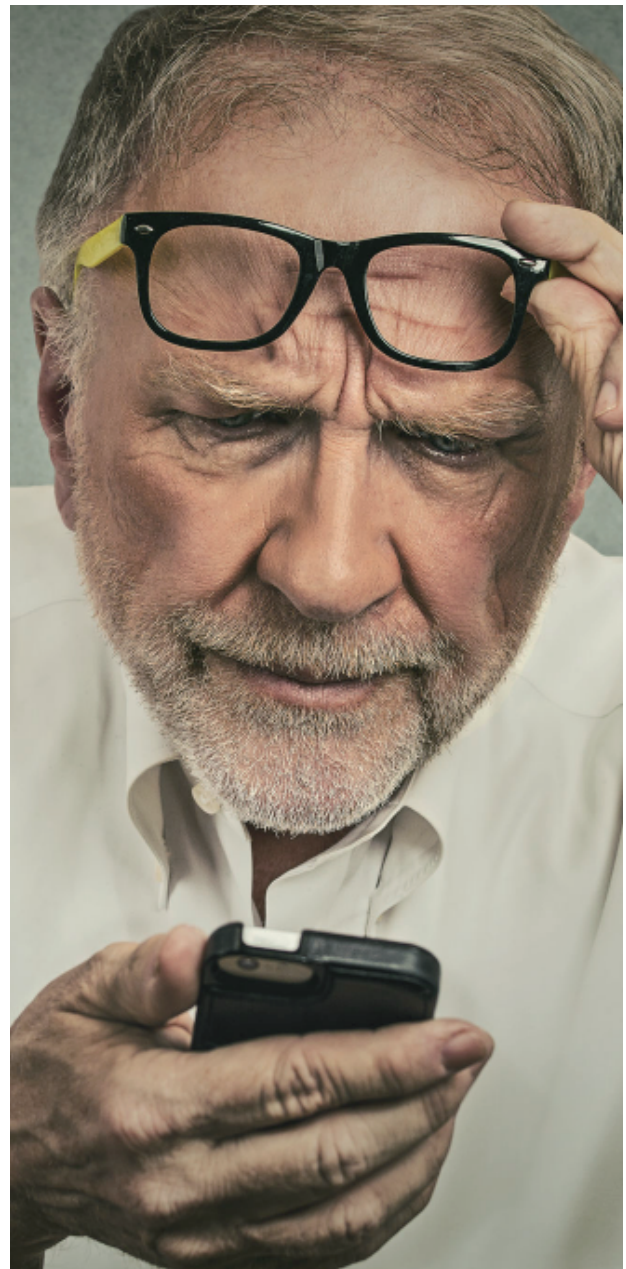
Age-related macular degeneration (AMD) is an eye disease that can blur your central vision. It happens when aging causes damage to the macula - the part of the eye that controls sharp, straight-ahead vision¹³.

2020	2040
196million	288million

**The number of people is expected living with macular degeneration*

There are 2 types of AMD: dry and wet. Most people with AMD have dry AMD (also called atrophic AMD). This is when the macula gets thinner with age. There's no treatment for late dry AMD, but you can find ways to make the most of your remaining vision¹³.

A 10-year NIH-funded study published in 2022 showed that a dietary supplement formulation (**500 mg vitamin C, 400 international units vitamin E, 2 mg copper, 80 mg zinc, 10 mg Lutein and 2mg zeaxanthin**) could significantly slow the progression of AMD from moderate to late disease¹⁴.



Challenges in Nutrient Application

- Nutrients with unsatisfactory stability are sensitive to degradation by chemical and physical factors.
- Ingredients with poor solubility and/or unpleasant odors restrict their applications in the finished products.
- Lower bioavailability of ingredients leads to poor customer response.

INNOBIO nutritional solutions by microencapsulation technologies

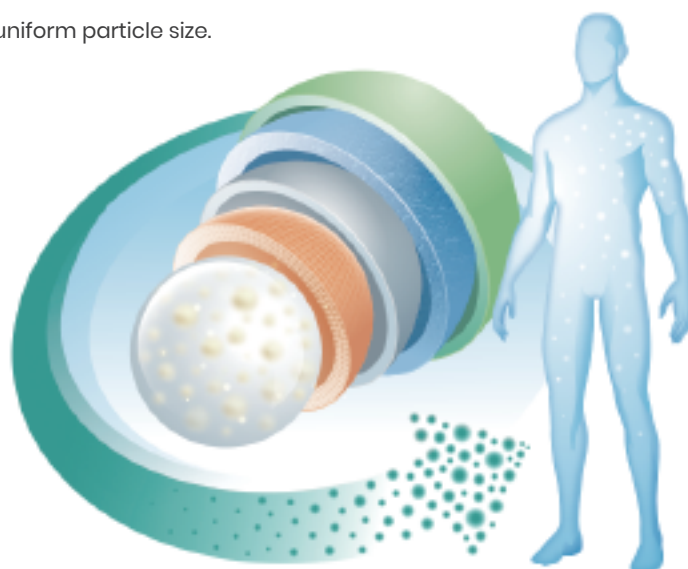
INNOBIO Beadlets technology

Outstanding embedding effect

- Double-shell structure provides high mechanical stability to protect nutrients.
- Good stability when tested under accelerated conditions (e.g. 40±2°C, 75±5 RH).
- Free-flowing powder with spherical particles and uniform particle size.

High bioavailability

- Beadlet emulsion has a median particle size of 500-600nm, released in the form of nano-emulsion droplets after entering the human body.
- Easy to digest and be absorbed by the human body, improving the bioavailability of the active ingredients.



XanGuard® Lutein and Zeaxanthin Beadlets-GF

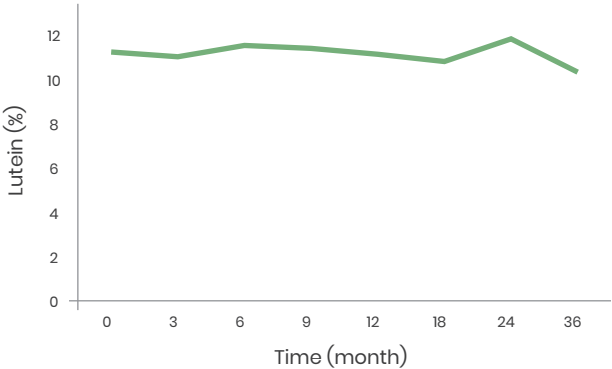


Fig 2. The stability of XanGuard® lutein 10% Beadlets - GF

Stability study:
Room temperature conditions for 36 months.

The retention rate is greater than 90%, the content is stable for a three-year shelf life.

XanGuard® Lutein and Zeaxanthin, naturally sourced from marigold flowers that are planted and harvested in house, is the result of more than 15 years of research and development by INNOBIO.



Fig 3. Tablets produced by direct compression with XanGuard® lutein 10% Beadlets - GF

XanGuard® lutein 10% Beadlets - GF is used in tablets by direct compression without oil extrusion.

LocVita® – a series of Vitamins including microencapsulated VA, VC, and VE products developed by INNOBIO.

LocVita® Vitamins come in multiple forms, including cold water dispersible powder, Beadlets and granular formulas that can meet customers' needs.

LocVita® Natural Vitamin E Acetate 950IU Beadlets

- Up to 70% Vitamin E oil load.
- Designed for tablets with superior mechanical strength.
- Uniform particle size, free-flowing powder.



Fig 4. Natural Vitamin E Acetate 950IU Beadlets and Tablets

DurOmega® – a series of high content, stable and cold water dispersible oil powders including omega 3, 6, and 9 built on our platform of microencapsulation technologies.











DurOmega® Algal DHA 20% WDP

- High stability with a higher integrity embedding and low surface oil content.
- Better odor and superior organoleptic properties, convenient for use in creating finished products.
- Excellent cold water dispersibility.



Fig 5. DurOmega® Algal DHA 20% WDP Disperse in Water

INNOBIO products for eye health

Products	Tablets	Beverages	Powders	Gummies	Energy Bars	Dairy products	Softgels
Lutein 20% Oil Suspension							
Lutein 5% CWS Powder							
Lutein 10% Beadlets GF							
Zeaxanthin 20% Oil Suspension							
Zeaxanthin 5% CWS Powder							
Zeaxanthin 5% Beadlets GF							
Algal DHA 10% Powder CWD							
Algal DHA 20% Powder WDP							
Vitamin A Acetate 325 Powder CWD-A							
Natural Vitamin E Acetate 950IU Beadlets							
Natural Vitamin E Acetate 700IU Powder CWD							
Ascorbic Acid 97% Granular							

With a focus on eye health, INNOBIO products can be widely used in softgels, tablets, gummies, drinks, foods, etc.

Cooperation with INNOBIO

INNOBIO is committed to providing comprehensive solutions for each customer's formulation requirements, especially for nutrients protection through our patented biosynthesis technologies and state of the art microencapsulation processing systems. By partner together, we can build long term relationships with our customers.



Based in Nature, Full of Health

Contact us

Website: www.innobioglobal.com

INNOBIO China

T: +86 411 65864666/65864677

E: info@innobio.cn

INNOBIO Europe B.V.

T: +31 (0) 702390015

E: info@innobioglobal.com

INNOBIO USA Inc.

T: 864-7356938

E: info@innobioglobal.com

References:

- 1.The world counts.
- 2.James M Stringham , Elizabeth J Johnson , B Randy Hammond. Lutein across the Lifespan: From Childhood Cognitive Performance to the Aging Eye and Brain. *Curr Dev Nutr* 2019; 3:nzz066.
- 3.Dominique Bre'mond-Gignac, Henri Copin, Alexandre Lapillonne. Visual development in infants: physiological and pathological mechanisms. *Current Opinion in Ophthalmology* 2011; 22 (Clinical Update 1):S1-S8.
- 4.John Elflein. People with myopia and high myopia worldwide 2000-2030. Dec 17, 2019.
- 5.Miaozhen Pan, Fei Zhao, Bintao Xie, et al. Dietary ω -3 polyunsaturated fatty acids are protective for myopia. *PNAS* 2021; Vol. 118.
- 6.Long Hin Li, Jetty Chung-Yung Lee, Ho Hang Leung, et al. Lutein Supplementation for Eye Diseases. *Nutrients* 2020; 12, 1721.
- 7.Stapleton F, Alves M, Bunya VY, et al. TFOS DEWS II Epidemiology Report. *Ocul Surf* 2017; 15:334.
- 8.Farrand KF, Fridman M, Stillman IÖ, Schaumberg DA. Prevalence of Diagnosed Dry Eye Disease in the United States Among Adults Aged 18 Years and Older. *Am J Ophthalmol* 2017; 182:90.
- 9.Mohamud A. Verjee, et al. Dry Eye Disease: Early Recognition with Guidance on Management and Treatment for Primary Care Family Physicians. *Ophthalmol Ther* 2020; 9:877-888.
- 10.Juntao Kan, Min Wang, Ying Liu, et al. A novel botanical formula improves eye fatigue and dry eye: a randomized, double-blind, placebo-controlled study. *Am J Clin Nutr* 2020; 112:334-342.
- 11.Saud A Alanazi, Gamal A El-Hiti, Abdulaziz A Al-Baloud, et al. Effects of short-term oral vitamin a supplementation on the ocular tear film in patients with dry eye. *Clinical Ophthalmology* 2019; 13:599-604.
- 12.Giuseppe Giannaccare, Marco Pellegrini, Stefano Sebastiani, et al. Efficacy of Omega-3 Fatty Acid Supplementation for Treatment of Dry Eye Disease: A Meta-Analysis of Randomized Clinical Trials. *Cornea* 2019; Volume 00, Number 00.
- 13.National eye institute, at a glance: AMD.
- 14.National eye institute, NIH study confirms benefit of supplements for slowing age-related macular degeneration, June 2, 2022.