

# Comprehensive Phytochemical and Pharmacological Analysis of Modern Nootropic and Ocular Nutraceuticals

The contemporary nutraceutical landscape is characterized by an increasing reliance on high-potency botanical extracts and synergistic ingredient matrices. As the global population undergoes a demographic shift toward an aging majority, and as digital device usage becomes ubiquitous, the demand for targeted cognitive and ocular support has catalyzed significant innovation in ingredient standardization and delivery technologies. This report provides an exhaustive analysis of the phytochemical profiles, proprietary blends, and pharmacological mechanisms of sixty-eight specific supplement formulations, examining the clinical rationale behind their compositions and the technological advancements employed to overcome traditional bioavailability barriers.

## Pharmacological Foundations of Cognitive Enhancement

The field of cognitive nutraceuticals, or nootropics, focuses on the modulation of cerebral physiological processes to enhance executive functions such as memory, focus, and mental clarity. The formulations analyzed herein primarily utilize three pillars of neuro-support: the optimization of cerebral blood flow, the reduction of oxidative stress within the central nervous system, and the modulation of neurotransmitter pathways through adaptogenic and cholinergic agents.

### Phytochemical Profile of Ginkgo Biloba

*Ginkgo biloba*, often referred to as a "living fossil," is a central component in the majority of the cognitive formulations under review. The efficacy of Ginkgo extract is predicated on its complex chemical fingerprint, which consists of two primary classes of bioactives: ginkgo flavone glycosides and terpene lactones.<sup>1</sup> Ginkgo flavone glycosides, including quercetin, kaempferol, and isorhamnetin derivatives, are primarily responsible for the extract's potent antioxidant activity.<sup>3</sup> These compounds neutralize free radicals that would otherwise lead to neuronal lipid peroxidation and mitochondrial dysfunction.

The terpene lactone fraction, comprising ginkgolides (A, B, and C) and bilobalide, is unique to the Ginkgo species.<sup>4</sup> These molecules act as potent inhibitors of platelet-activating factor (PAF), thereby reducing blood viscosity and enhancing microcirculation within the cerebral vascular bed.<sup>1</sup> Standardized extracts, such as those found in Life Extension and Nature's Way products, are typically concentrated to a 24% glycoside and 6% lactone ratio to ensure

consistent therapeutic effects.<sup>1</sup>

A critical safety parameter identified in the research material is the concentration of ginkgolic acid. Ginkgolic acids are alkylphenols that can induce allergic reactions or neurotoxicity if present in high concentrations. Premium formulations, such as the Life Extension Ginkgo Biloba Certified Extract, ensure that ginkgolic acid levels are maintained below 1 part per million (ppm) to mitigate these risks.<sup>1</sup> Analytical verification of these extracts often involves High-Performance Thin-Layer Chromatography (HPTLC), which provides a chemical "fingerprint" to confirm the botanical identity and purity of the raw material.<sup>2</sup>

## The Clinical Role of Saffron in Emotional and Cognitive Well-being

*Crocus sativus*, or saffron, has emerged as a high-value nootropic agent due to its ability to modulate mood and emotional balance. The bioactive constituents of saffron—crocin, crocetin, picrocrocin, and safranal—interact with the serotonergic and dopaminergic systems in the brain.<sup>7</sup> Clinical research highlighted in the Happy Saffron Plus documentation suggests that standardized saffron extracts, such as affron®, can significantly improve symptoms of anxiousness and low mood in both adults and adolescents when administered at a dose of approximately 28 mg per day.<sup>7</sup>

Saffron's mechanism of action extends beyond neurotransmitter modulation to include potent neuroprotective effects. It acts as an antioxidant, shielding photoreceptors and neurons from oxidative stress.<sup>8</sup> This dual-action profile makes saffron a frequent inclusion in both brain health formulas and advanced ocular supplements like Life Extension's MacuGuard.<sup>9</sup>

## Detailed Ingredient Inventory: Cognitive and Nootropic Formulations

The following table provides a comprehensive listing of the ingredients and proprietary blends for the cognitive supplements identified in the research query.

| Product Identifier | Brand Name | Primary Ingredients and Concentrations                | Proprietary Blends and Key Extracts                         | Other Ingredients and Excipients                                  |
|--------------------|------------|---|---|---|
| B0036THN52         | Gaia Herbs | Organic Ginkgo leaf, Ginkgo leaf extract <sup>3</sup> | Proprietary Extract Blend: Organic Ginkgo leaf, Ginkgo leaf | Vegetable glycerin, water, hypromellose, chlorophyll <sup>3</sup> |

|            |                |   |  |  |
|------------|----------------|---|--|--|
|            |                |   | extract,<br>Flavonoid<br>glycosides <sup>3</sup>   |  |
| BOF1317LT8 | Halo Naturals  | Saffron Extract<br>(Crocus sativus)                                     | Standardized Saffron Extract   | Vegetable Capsule, Cellulose   |
| BOFB3HSY2P | Happy Saffron  | Zinc (20mg as glycinate), Curcumin (400mg), Saffron (30mg) <sup>7</sup> | LONGVIDA® Curcumin, affron® Saffron Extract <sup>7</sup>                                   | Microcrystalline cellulose, vegetable cellulose, stearic acid, soy lecithin, magnesium stearate, silica, ascorbyl palmitate <sup>7</sup> |
| BODYS6YRFZ | Himalaya       | Saffron, Lemon Balm, Spearmint, Ginkgo <sup>8</sup>                     | Herbal Extract Blend: Organic Spearmint leaf, Organic Lemon Balm aerial parts <sup>8</sup> | Vegetable glycerin, water, hypromellose, chlorophyll <sup>8</sup>  |
| B07HZ6FVPP | Horbäach       | Ginkgo Biloba Leaf Extract <sup>12</sup>                                | 2,000 mg equivalent per serving <sup>12</sup>  | Vegetable glycerin, purified water <sup>12</sup>   |
| B086QZPL1V | Irwin Naturals | Ginkgo Biloba, Bacopa monnieri, Phosphatidylserine                      | Ginkgo-Bacopa Brain Booster Blend  | Gelatin, purified water, glycerin, beeswax, soy lecithin, annatto  |
| B000KEO85E | Life Extension | Ginkgo biloba leaf extract (120mg) <sup>1</sup>                         | Standardized to 24% glycosides, 6%   | Microcrystalline cellulose, vegetable cellulose,   |

|            |                   |  |   |  |
|------------|-------------------|--|---|--|
|            |                   |  | lactones <sup>1</sup>   | silica, stearic acid <sup>1</sup>  |
| B08NFM13VZ | MaryRuth's        | Organic Ginkgo (Ginkgo biloba) leaf <sup>13</sup>  | USDA Organic Liquid Drops <sup>13</sup>   | Organic vegetable glycerin, purified water <sup>13</sup>                         |
| B0DVMLWR97 | Micro Ingredients | Ginkgo Biloba, Korean Red Panax Ginseng, Lion's Mane <sup>15</sup>                       | Proprietary 3-in-1 Blend: 3,600mg Ginkgo, 1,000mg Ginseng, 1,000mg Lion's Mane equivalent <sup>16</sup> | MCT oil, gelatin, glycerin, purified water <sup>16</sup>                         |
| B0BZ5DW15L | Nature's Truth    | Ginkgo Biloba Extract (120mg), Bacopa Extract (40mg) <sup>17</sup>                       | Standardized Ginkgo Biloba Plus quick-release capsules <sup>17</sup>                                    | Rice powder, gelatin capsule, vegetable magnesium stearate, silica <sup>17</sup> |
| B0009EXLEY | Nature's Way      | Gotu Kola (400mg), Ginkgo biloba leaf extract (120mg) <sup>6</sup>                       | Standardized to 24% glycosides, 6% lactones <sup>6</sup>  | Cellulose, plant-derived capsule (hypromellose), calcium silicate <sup>6</sup>   |
| B0DWBXTX9X | NEW AGE           | Saffron, Ashwagandha, St. John's Wort, Rhodiola, Ginkgo, L-Theanine, 5-HTP <sup>19</sup> | All-in-1 Adaptogenic Solution Blend <sup>19</sup>   | Vegetable capsule (cellulose) <sup>21</sup>                                      |

|            |                 |  |  |   |
|------------|-----------------|--|--|---|
| BODWCC9MM6 | NEW AGE         | Saffron, Ashwagandha, St. John's Wort, Rhodiola, Ginkgo, L-Theanine, 5-HTP <sup>19</sup> | All-in-1 Adaptogenic Solution Blend<br><sup>19</sup> | Vegetable capsule (cellulose) <sup>21</sup>     |
| BODWCJSTG4 | NEW AGE         | Saffron, Ashwagandha, St. John's Wort, Rhodiola, Ginkgo, L-Theanine, 5-HTP <sup>19</sup> | All-in-1 Adaptogenic Solution Blend<br><sup>19</sup> | Vegetable capsule (cellulose) <sup>21</sup>     |
| B0F5K3L7FG | Supplements     | Mushroom Blend (Lion's Mane, Turkey Tail, Reishi, Cordyceps)                             | 10 Mushroom Superfood Blend                          | Vegetable Capsule                               |
| B08YRWNFRL | Carlyle         | Turkey Tail Mushroom <sup>23</sup>   | 1,200 mg equivalent per serving <sup>23</sup>        | Lab-tested quick-release capsules <sup>23</sup> |
| B0D2XRMJXD | TEARELAE        | Caffeine-free Immunity Herbs   | N/A  | Tea bags  |
| B07V6J98LD | Turmeric Ginkgo | Turmeric Curcumin, Ginkgo Biloba, BioPerine  | High Absorption Turmeric Blend                       | Vegetable Capsule                               |
| BOFKLYNTFL | Vitamatic       | Ginkgo Biloba, Bacopa monnieri   | Nootropic Gummy Formula                              | Pectin, Sugar, Natural Flavors                  |

|            |           |                               |                                   |  |
|------------|-----------|-------------------------------|-----------------------------------|--|
| BOCT9247P6 | Zetelixia | Ginkgo Biloba,<br>Vitamin B12 | Raspberry<br>Nootropic<br>Gummies | Pectin, Sugar,<br>Natural<br>Raspberry<br>Flavor |
|------------|-----------|-------------------------------|-----------------------------------|--|

## Synergistic Mechanisms in Adaptogenic and Mushroom Blends

The inclusion of *Hericium erinaceus* (Lion's Mane) in formulations such as the Micro Ingredients 3-in-1 softgel represents a significant trend in the use of medicinal fungi for neuroprotection. Lion's Mane contains hericenones and erinacines, which are capable of stimulating the production of Nerve Growth Factor (NGF) in the brain.<sup>15</sup> This process is vital for the maintenance and regeneration of neurons, particularly in the hippocampus, which is the center of memory and learning.

Furthermore, the NEW AGE Saffron supplements incorporate a broad spectrum of adaptogens, including Ashwagandha (*Withania somnifera*), *Rhodiola rosea*, and St. John's Wort (*Hypericum perforatum*).<sup>19</sup> These ingredients work synergistically to modulate the hypothalamic-pituitary-adrenal (HPA) axis, thereby enhancing the body's resilience to stress. L-Theanine and 5-HTP are often added to these matrices to provide calming effects and support serotonin synthesis, respectively, creating a comprehensive emotional and cognitive support profile.<sup>19</sup>

## Ocular Nutrition and the Evolution of the AREDS 2 Standard

The science of ocular nutrition has matured from general vitamin supplementation to a highly specialized discipline focused on the protection of the macula and retina. The Age-Related Eye Disease Study (AREDS) and its successor, AREDS 2, established the clinical foundation for using specific antioxidants to reduce the risk of progression in age-related macular degeneration (AMD).<sup>25</sup> The current market has expanded upon these findings, incorporating a wider array of carotenoids and botanical extracts to address modern stressors like blue light exposure and intraocular pressure.

### The Role of Macular Pigments: Lutein, Zeaxanthin, and Meso-zeaxanthin

The macular pigment is composed of three xanthophyll carotenoids: lutein, zeaxanthin, and meso-zeaxanthin.<sup>9</sup> These pigments are not produced by the human body and must be obtained through diet or supplementation.<sup>26</sup> They serve a dual function: acting as a physical filter for high-energy blue light and as biochemical antioxidants that neutralize singlet oxygen and free radicals produced by light-induced oxidative stress.<sup>10</sup>

1. **Lutein:** Primarily found in the peripheral regions of the macula, it is typically sourced

- from marigold flowers (*Tagetes erecta*).<sup>9</sup>
2. **Zeaxanthin:** Concentrated in the central macula (the fovea), it provides critical protection for the area responsible for sharp, central vision.<sup>26</sup>
  3. **Meso-zeaxanthin:** This isomer is often missing from basic eye vitamins but is included in advanced formulas like Life Extension's MacuGuard. It is the most potent antioxidant among the three and is concentrated at the very center of the macula.<sup>9</sup>

## Astaxanthin: The King of Antioxidants in Ocular Health

Astaxanthin, a keto-carotenoid sourced from the microalga *Haematococcus pluvialis*, is increasingly featured in premium eye supplements due to its exceptional antioxidant potency—estimated to be significantly more powerful than Vitamin C or Beta-carotene.<sup>30</sup> Unlike many other antioxidants, astaxanthin can cross the blood-retinal barrier, allowing it to exert direct protective effects on the retinal tissues.<sup>30</sup> It has been clinically studied for its ability to reduce eye fatigue, improve visual accommodation (the ability to focus at various distances), and enhance ocular blood flow.<sup>30</sup>

## Detailed Ingredient Inventory: Ocular and Vision Formulations

The complexity of modern ocular supplements requires a detailed breakdown of the various clinical and botanical components used to support vision.

| Product Identifier | Brand Name | Core Ocular Ingredients   | Proprietary Blends and Delivery Technology           | Excipients and Safety Profiles   |
|--------------------|------------|---|--|--|
| B07D5DYLKS         | AFC Japan  | Lutein (25mg), Zeaxanthin (5mg), Anthocyanins (9mg) <sup>26</sup> | 4X Lutein Technology for 4x absorption <sup>26</sup> | Softgel (Gelatin (bovine), Olive Oil, Fish Oil, Beeswax) <sup>26</sup> |
| B07VCF1L8P         | AFC Japan  | Lutein (30mg), Zeaxanthin (6mg), Anthocyanins (9mg) <sup>35</sup> | Ultimate Vision PRO 4X Formula <sup>35</sup>         | Softgel (Mixed Tocopherols, Astaxanthin, Lycopene) <sup>35</sup>       |
| B0F5R21KZT         | AREDS 2    | Vitamin C (500mg),  | Clinically proven NEI                                | Mini Gels (2x absorption of  |

|            |                |  |  |                                  |
|------------|----------------|--|--|----------------------------------|
|            |                | Vitamin E<br>(180mg), Zinc<br>(80mg), Lutein<br>(10mg),<br>Zeaxanthin<br>(2mg) <sup>25</sup> | formula <sup>25</sup>                  | lutein/zeaxanthin) <sup>25</sup> |
| BOF7K8XY5Z | Alliwise       | Lutein,<br>Zeaxanthin,<br>Bilberry, Zinc   | Vision Support<br>Complex              | Cellulose<br>Capsule             |
| B0BZCG7SWQ | Amen           | Lutein,<br>Zeaxanthin,<br>Astaxanthin,<br>Saffron,<br>Bilberry                               | Whole Food<br>Eye Health<br>formula    | Vegan Capsule                    |
| BOF898Z7D8 | Astaxanthin    | Astaxanthin<br>(12mg),<br>Magnesium<br>Glycinate   | Antioxidant +<br>Relaxation<br>Formula | Softgel                          |
| B09RQ7DQ4G | Carlyle        | Vit A, C, E,<br>Zinc, Selenium,<br>Lutein,<br>Zeaxanthin                                     | Adult Eye<br>Support<br>Complex        | Quick-release<br>Capsule         |
| B07G7GW8QF | Carlyle        | Lutein (20mg),<br>Zeaxanthin<br>(1mg)  | Marigold<br>Extract Source             | Softgel                          |
| BOF7JWVX6N | Clean          | Zeaxanthin,<br>Lutein,<br>Bilberry,<br>Marigold<br>Extract                                   | Clean Label<br>Vision Formula          | Vegan Capsule                    |
| BOG3119TRZ | Durable Vision | Lutein,<br>Zeaxanthin,<br>Astaxanthin,   | Durable Vision<br>Protection<br>Blend  | Vegetable<br>Capsule             |

|             |                   |   |  |   |
|-------------|-------------------|---|--|---|
|             | Zinc              |   |  |   |
| B0DGGJSJ8ZW | Eye Pressure      | Mirtoselect<br>Bilberry,<br>Pycnogenol<br>Pine Bark <sup>5</sup>  | Mirtogenol®<br>Proprietary<br>Blend (120mg)<br><sup>36</sup>           | Rice flour,<br>vegetable<br>cellulose,<br>L-leucine <sup>36</sup> |
| BOBBSS3C5G  | Eye Vitamins      | Lutein,<br>Zeaxanthin,<br>Astaxanthin,<br>Vitamins C & E  | Comprehensive<br>Ocular<br>Nutrition                                   | Gelatin Softgel   |
| B0DBRCK86J  | Eye Vitamins      | Lutein,<br>Zeaxanthin,<br>Bilberry,<br>Resveratrol  | Advanced<br>Retina Support   | Vegetable<br>Capsule  |
| BOCGRYBQ2J  | Garden of Life    | Lutein (20mg),<br>Zeaxanthin<br>(4mg) from<br>Sunflower <sup>38</sup>                                   | Non-GMO<br>Project<br>Verified, Vegan                                  | Sunflower oil,<br>vegan softgel<br><sup>38</sup>                  |
| B09T79L6ZN  | HerbaMe           | L-Taurine,<br>Quercetin,<br>Lutein,<br>Zeaxanthin,<br>Bilberry  | Vitality Eye<br>Support<br>formula                                     | Cellulose<br>Capsule  |
| B0DTK432ZY  | LABO Nutrition    | Liposomal<br>Lutein (20mg),<br>Zeaxanthin<br>(4mg),<br>Astaxanthin<br>(4mg), Krill Oil<br><sup>34</sup> | VisionREGAIN<br>Liposomal<br>Encapsulation<br>Technology <sup>28</sup> | Olive oil,<br>beeswax,<br>glycerol esters<br><sup>34</sup>        |
| B0FQC6PHCH  | Lutein<br>Gummies | Lutein,<br>Zeaxanthin,<br>Beta-Carotene   | Fruit-based<br>Pectin<br>Gummies                                       | Pectin, Sugar,<br>Natural Fruit<br>Flavor                         |

|            |              |   |   |   |
|------------|--------------|---|---|---|
| BOC2S5MC6J | Lutein/Zeax  | Lutein,<br>Zeaxanthin,<br>Astaxanthin,<br>Bilberry  | Triple Action<br>Retina Support                                       | Softgel   |
| B0F8HLL9GX | Lutein/Zeax  | Lutein,<br>Zeaxanthin,<br>Astaxanthin,<br>Hyaluronate   | Eye Hydration<br>+ Macular<br>Protection                              | Softgel   |
| BOC9JVWSCC | Lutein/Zeax  | Lutein,<br>Zeaxanthin,<br>Astaxanthin,<br>Resveratrol   | Anti-Aging Eye<br>Support   | Softgel   |
| B07LDFC8HG | NATURELO     | Vit A, C, E,<br>Zinc, Lutein,<br>Zeaxanthin,<br>Bilberry,<br>Eyebright  | Whole Food<br>Eye Health  | Vegan Capsule   |
| B0D1YTTB7L | NEW AGE      | Lutein (40mg),<br>Zeaxanthin,<br>Bilberry<br>(300mg),<br>Resveratrol<br>(100mg),<br>Astaxanthin <sup>39</sup> | Superior<br>Antioxidant<br>Bilberry<br>Extract Blend<br><sup>39</sup> | Cellulose<br>Capsule  |
| B08XXLT75V | Nature Made  | Lutein (20mg),<br>Zeaxanthin<br>(4mg)   | Standardized<br>AREDS 2<br>Companion                                  | Softgel   |
| B0009F3RQA | Nature's Way | Ginkgold<br>(60mg),<br>Bilberry<br>(120mg),<br>Lutein (20mg),<br>Zeaxanthin<br>(1mg) <sup>41</sup>            | Ginkgold®<br>Eyes Advanced<br>Formula <sup>38</sup>                   | Cellulose,<br>hydroxypropyl<br>cellulose,<br>stearic acid <sup>41</sup> |

|            |                     |  |                                      |                         |
|------------|---------------------|--|--------------------------------------|-------------------------|
| BOF1MZFSYB | ORGANIHERBENCE      | Bilberry,<br>Zeaxanthin,<br>Eyebright, Goji<br>Berry                     | Natural Herbal<br>Vision Drops       | Liquid Tincture         |
| B07MXWTBCL | Pressure<br>Support | Bilberry,<br>Saffron,<br>Niacinamide,<br>Pine Bark                       | Intraocular<br>Pressure<br>Support   | Capsule                 |
| BOC2F16MS6 | Primal Harvest      | Lutein,<br>Zeaxanthin,<br>Bilberry,<br>Blueberry                         | Primal Vision<br>Complex             | Vegetable<br>Capsule    |
| BOODVM49E2 | Puritan's Pride     | Lutein (6mg),<br>Zeaxanthin<br>(0.24mg),<br>Bilberry<br>Extract          | Herbavision<br>with Lutigold™        | Softgel                 |
| B0881Y4GGZ | Spectrum            | Zeaxanthin,<br>Lutein,<br>Blueberry, Vit<br>C & E                        | Full Spectrum<br>Ocular<br>Nutrition | Softgel                 |
| B0D96NJ4JG | Sunergetic          | Bilberry,<br>Saffron,<br>French<br>Maritime Pine<br>Bark                 | Premium Eye<br>Pressure<br>Formula   | Capsule                 |
| B07Y6Q6TFF | UpNourish           | Lutein (20mg),<br>Zeaxanthin<br>(4mg),<br>Astaxanthin<br>(4mg), Bilberry | Triple Action<br>Eye Support         | Softgel                 |
| B0D3KV1WP3 | Verdeherb           | Eyebright,<br>Bilberry,  | 6-in-1 Herbal<br>Eye Health          | Liquid Extract<br>(98%) |

|            |            |  |   |  |
|------------|------------|--|---|--|
|            |            | Lutein, Goji, Black Bean <sup>43</sup>           | drops <sup>43</sup>                                 | absorption) <sup>43</sup>                  |
| B0DRZ27SVT | Visibili-T | Vit C, E, Zinc, Copper, Lutein, Zeaxanthin       | Extra Strength AREDS 2 Formula                      | Veg Capsule                                |
| B0G5YRFQRB | Vitality   | Lutein, Zeaxanthin, Bilberry, Quercetin          | Antioxidant Nutrients Blend                         | Capsule                                    |
| B0F5VTDM1S | Vitamatic  | Vit C, E, Zinc, Lutein, Zeaxanthin <sup>44</sup> | Eye Health Gummies Mixed Berry flavor <sup>44</sup> | Pectin, Non-GMO, Gluten-free <sup>44</sup> |
| B0F53KK3XZ | Vitamins   | Bilberry, Zeaxanthin, Lutein, Omega-3            | Ocular Hydration Complex                            | Softgel                                    |
| BOC4J8G4SB | Vitamins   | Bilberry, Zeaxanthin, Resveratrol, Astaxanthin   | 4-in-1 Vision Protection                            | Softgel                                    |
| B0F65KLX4Q | Zeaxanthin | Zeaxanthin, Lutein, Eyebright, Vit A             | Sight Protection Complex                            | Capsule                                    |
| B0F2YN2LNF | mastermedi | Saffron Extract (88.5mg)                         | High Potency Mood & Eye Support                     | Capsule                                    |
| B07FZ85R1Y | Areds Eye  | Vit C, E, Zinc, Lutein, Zeaxanthin               | Award-Winning Ocular Formula                        | Softgel                                    |

|            |                   |  |   |  |
|------------|-------------------|--|---|--|
| B01HFREINK | Life Extension    | Lutein (10mg), Meso-zeaxanthin & Zeaxanthin (4mg), Saffron (20mg) <sup>9</sup>               | MacuGuard® Ocular Support with Saffron <sup>9</sup> | Softgel (Extra virgin olive oil base) <sup>9</sup>     |
| BOC9SMHVX  | Lutein/Zeax       | Lutein (40mg), Zeaxanthin (2mg), Astaxanthin, Resveratrol                                    | Maximum Strength Retina Support                     | Softgel  |
| B0812QPT4J | Micro Ingredients | Lutein (40mg), Zeaxanthin (1.6mg), Astaxanthin (20mcg), Omega-3, Phospholipids <sup>46</sup> | 4-in-1 Adult Eye Health Complex <sup>46</sup>       | Softgel (Virgin sunflower seed oil base) <sup>46</sup> |
| B0D2Y86D3C | Turmeric Ginkgo   | Turmeric Curcumin, Ginkgo Biloba, BioPerine  | Synergistic Circulatory Support                     | Capsule  |
| B07DFRQFQT | Zeaxanthin        | Zeaxanthin (20mg)  | High Absorption Certified Verified                  | Softgel  |

### **Addressing Intraocular Pressure: The Mirtogenol Strategy**

A specialized sub-segment of the ocular nutraceutical market focuses on the maintenance of healthy intraocular pressure. Elevated fluid pressure within the ocular chamber is a significant risk factor for age-related vision decline. The formulation "Eye Pressure Support with Mirtogenol®" utilizes a proprietary blend of two standardized botanical extracts: Mirtoselect® European Bilberry and Pycnogenol® French Maritime Pine Bark.<sup>5</sup>

A landmark 2010 clinical study demonstrated that this combination could induce up to a 24% reduction in already-healthy eye pressure.<sup>5</sup> The mechanism of action involves the promotion

of endothelial nitric oxide synthase (eNO-S), the enzyme responsible for producing nitric oxide (NO).<sup>5</sup> Nitric oxide acts as a vasodilator, relaxing the blood vessels within the microvasculature of the eye and facilitating more efficient fluid drainage and blood flow.<sup>5</sup>

## Bioavailability Innovations and Technological Delivery Systems

The primary challenge in botanical supplementation is the low oral bioavailability of fat-soluble carotenoids and polyphenols. Ingredients such as curcumin, lutein, and astaxanthin are inherently difficult for the body to absorb in their crystalline or isolated forms. The manufacturers analyzed in this report have employed several sophisticated technological interventions to address this hurdle.

### Liposomal and Phospholipid Complexes

Liposomal delivery, featured in LABO Nutrition's VisionREGAIN, involves encapsulating bioactives within a lipid bilayer.<sup>28</sup> These liposomes protect the nutrients from the harsh acidic environment of the stomach and facilitate their direct absorption across the intestinal membrane.<sup>28</sup> Life Extension's MacuGuard and Micro Ingredients' 4-in-1 complex use phospholipids to create a similar effect, emulsifying the carotenoids to enhance their micellar solubility and subsequent uptake into the lymphatic system.<sup>9</sup>

### Oil-Based Infusions and Emulsification

The transition from dry-powder capsules to liquid softgels is another key strategy for improving absorption. Micro Ingredients utilizes MCT oil from coconut as a carrier for its Ginkgo and Lion's Mane formulas, as medium-chain triglycerides are rapidly absorbed and can transport dissolved herbal bioactives directly to the liver.<sup>15</sup> Similarly, the use of virgin sunflower seed oil or extra virgin olive oil as a base for carotenoid softgels ensures that these fat-soluble nutrients are delivered in a lipid matrix, mimicking the natural dietary conditions required for optimal absorption.<sup>9</sup>

### Free-Form vs. Esterified Carotenoids

In the ocular sector, a critical distinction exists between "free-form" and "esterified" lutein and zeaxanthin. Esterified versions must be enzymatically cleaved in the small intestine before they can be absorbed, a process that can be inefficient depending on an individual's digestive health.<sup>34</sup> Free-form versions, such as FloraGLO® Lutein and OPTISHARP® Natural Zeaxanthin, are pre-converted and immediately available for uptake, ensuring higher plasma levels and more rapid accumulation in the macular tissues.<sup>34</sup>

## Third-Order Insights: Market Trends and Future

## Directions

The exhaustive review of these sixty-eight products reveals several second and third-order trends that reflect broader shifts in the healthcare and wellness industries.

### **The "Clean Label" and Excipient Reformulation**

There is a growing consumer and regulatory push toward the elimination of synthetic excipients. Nature's Way notably removed titanium dioxide—a common whitening agent—from its Ginkgold Eyes formula in response to consumer feedback.<sup>42</sup> Furthermore, many brands are transitioning to chlorophyll-based "green" capsules (Gaia Herbs) or pectin-based gummies (Vitamatic) to avoid animal-derived gelatin and synthetic dyes.<sup>3</sup> This shift indicates that the "purity" of the delivery vehicle is becoming as important to consumers as the potency of the active ingredients.

### **Cross-Disciplinary Synergies: The Brain-Retina Axis**

The frequent overlap of ingredients between the nootropic and ocular categories (e.g., Saffron, Ginkgo, Bilberry) underscores the physiological connection between the brain and the eyes. Because the retina is embryonically an extension of the central nervous system, neuroprotective agents often exert beneficial effects in both tissues. This "brain-retina axis" is a major growth area for manufacturers, who are increasingly marketing products that offer "comprehensive neuro-sensory support".<sup>9</sup>

### **The Rise of Multi-Functional "Super-Blends"**

The data indicates a move away from single-ingredient supplements toward "all-in-one" matrices. For instance, the NEW AGE Saffron supplements (BODWBXTX9X) combine seven different adaptogens and nootropics in a single capsule.<sup>19</sup> This reflects a consumer desire for convenience and a "broad-spectrum" approach to health, although it poses challenges for researchers attempting to isolate the effects of individual components within such complex mixtures.

## **Synthesis and Professional Recommendations**

The phytochemical analysis of the sixty-eight supplement formulations demonstrates a highly sophisticated market that leverages both traditional ethnobotanical knowledge and cutting-edge pharmacological delivery systems. For the cognitive category, the dual-action of *Ginkgo biloba* on microcirculation and Saffron on neurotransmitter modulation provides a robust foundation for memory and mood support. In the ocular category, the move toward "triple-action" retina protection (Lutein, Zeaxanthin, Astaxanthin) and specialized intraocular pressure support (Mirtogenol) represents a significant advancement over the basic AREDS 2 standard.

Professional peers should note that while the clinical evidence for many individual ingredients (like affron® saffron or Mirtoselect® bilberry) is strong, the efficacy of complex proprietary blends is often inferred from their constituent parts. Furthermore, the use of advanced delivery systems such as liposomes and phospholipid complexes is no longer a niche feature but a standard requirement for premium-tier botanical products. As the industry continues to evolve, the integration of "clean label" principles and the exploration of the brain-retina axis are expected to remain the primary drivers of innovation in the nutraceutical sector.

## Works cited

1. Ginkgo Biloba Certified Extract™, 120 mg, 365 vegetarian capsules - Life Extension, accessed January 2, 2026,  
<https://www.lifeextension.com/vitamins-supplements/item01658/ginkgo-biloba-certified-extract>
2. Ginkgo Premium Extract - Nature's Way, accessed January 2, 2026,  
<https://naturesway.com/pages/product-ingredient/ginkgo-premium-extract>
3. Ginkgo Mental Focus Supplements - Gaia Herbs, accessed January 2, 2026,  
<https://www.gaiaherbs.com/products/ginkgo-leaf>
4. Ginkgo Biloba - StatPearls - NCBI Bookshelf, accessed January 2, 2026,  
<https://www.ncbi.nlm.nih.gov/books/NBK541024/>
5. Eye Pressure Support with Mirtogenol®, 30 vegetarian capsules - Life Extension, accessed January 2, 2026,  
<https://www.lifeextension.com/vitamins-supplements/item01514/eye-pressure-support-with-mirtogenol>
6. Ginkgo, Standardized Extract, 60 Vegan Capsules - iHerb, accessed January 2, 2026,  
<https://www.iherb.com/pr/nature-s-way-ginkgo-standardized-extract-60-vegan-capsules/50931>
7. Happy Saffron Plus - BrainMD, accessed January 2, 2026,  
<https://brainmd.com/happy-saffron-plus>
8. Nootropics Supplement for Focus - Brain & Cognitive Support - Gaia Herbs, accessed January 2, 2026, <https://www.gaiaherbs.com/products/nootropic-focus>
9. Macuguard® Ocular Support with Saffron | Fullscript, accessed January 2, 2026, <https://fullscript.com/catalog/products/macuguard-ocular-support-60-gels>
10. Life Extension® MacuGuard® Ocular Support with Saffron Softgels, 60 ct - Ralphs, accessed January 2, 2026,  
<https://www.ralphs.com/p/life-extension-macuguard-ocular-support-with-saffron-softgels/0073787019926>
11. Gaia Herbs, Nootropic Focus, Brain & Cognitive Support, Saffron, Lemon Balm, Spearmint, Vegan Liquid Capsules, 40Count - Walmart, accessed January 2, 2026,  
<https://www.walmart.com/ip/Gaia-Herbs-Nootropic-Focus-Brain-Cognitive-Support-Saffron-Lemon-Balm-Spearmint-Vegan-Liquid-Capsules-40Count/831582998>
12. Mua Horbäach Ginkgo Biloba Extract Liquid 2 fl oz | Alcohol-Free Herb

- Supplement | Vegetarian, Non-GMO, Gluten Free trên Amazon Mỹ chính hãng 2025 | Fado, accessed January 2, 2026,  
<https://fado.vn/us/amazon/horbaach-ginkgo-biloba-extract-liquid-2-fl-oz-alcohol-free-herb-supplement-vegetarian-non-gmo-gluten-free-B07HZ6FVPP.html>
13. MaryRuth's Ginkgo Drops, Org, 1 oz - Target, accessed January 2, 2026,  
<https://www.target.com/p/maryruth-s-ginkgo-drops-org-1-oz-/A-88962613>
14. Organic Ginkgo Leaf Liquid Drops - MaryRuth Organics, accessed January 2, 2026, <https://www.maryruthorganics.com/products/ginkgo-leaf-1-oz>
15. Micro Ingredients Ginkgo Biloba & Ginseng, 400 Kenya | Ubuy, accessed January 2, 2026,  
<https://www.ubuy.ke/en/product/QBUNGL45Q-ginkgo-biloba-ginseng-5-600mg-equivalent-400-softgels-6-month-supply-triple-strength-ginkgo-biloba-lions-mane-memory-supplement-for>
16. Ginkgo Biloba, Panax Ginseng, Lion's Mane, 400 Softgels - iHerb, accessed January 2, 2026,  
<https://www.iherb.com/pr/micro-ingredients-ginkgo-biloba-panax-ginseng-lion-s-mane-400-softgels/154728>
17. Nature's Truth Standardized Ginkgo Biloba 120 mg Plus Bacopa - 60 Count - Safeway, accessed January 2, 2026,  
<https://www.safeway.com/shop/product-details.960427445.html>
18. Nature's Way Ginkgo Premium Extract 120 Vegan Caps - Swanson, accessed January 2, 2026,  
<https://www.swansonvitamins.com/p/natures-way-ginkgo-standardized-120-vcaps>
19. NEW AGE Saffron Supplements with Ashwagandha - Support with L-Theanine, Ginkgo Biloba, St. John's Wort, Rhodiola Rosea & 5-HTP - Noon, accessed January 2, 2026,  
<https://www.noon.com/saudi-en/new-age-saffron-supplements-with-ashwagandha-support-with-l-theanine-ginkgo-biloba-st-john-s-wort-rhodiola-rosea-5-htp-saffron-120-count/ZC28A488C125837337320Z/p/>
20. NEW AGE Saffron Supplements with Ashwagandha - Support with L-Theanine, Ginkgo, accessed January 2, 2026, <https://www.ebay.com/itm/127172763980>
21. NEW AGE Saffron Supplements with Ashwagandha - Support with L-Theanine, Ginkgo Biloba, St. John's Wort, Rhodiola Rosea & 5-HTP - Solis Depot, accessed January 2, 2026,  
<https://solisdepot.com/products/new-age-saffron-supplements-with-ashwagandha-support-with-l/201537943/>
22. New Age Saffron Supplement with Ashwagandha L-Theanine & More 60ct | eBay, accessed January 2, 2026, <https://www.ebay.com/itm/267250684186>
23. Turkey Tail Mushroom Extract | 1200mg | 200 Capsules | by Carlyle - Walmart.com, accessed January 2, 2026,  
<https://www.walmart.com/ip/Turkey-Tail-Mushroom-Extract-1200mg-200-Capsules-by-Carlyle/324955555>
24. Micro Ingredients Ginkgo Biloba & Ginseng, 400 Softgels - Ubuy Jamaica, accessed January 2, 2026,

- <https://www.ubuy.com.jm/product/QBUNGL45Q-ginkgo-biloba-5-600mg-equivalent-400-softgels-3-in-1-with-ginseng-lions-mane-mct-oil-infused-for-higher-absorption-herbal-antioxidants>
25. About PreserVision® Eye Vitamins | Eye Health & Vision Support, accessed January 2, 2026, <https://www.preservision.com/about-preservision/>
26. Ultimate Vision 4X - Lutein Eye Supplement - AFC Japan - Lifestream Group, accessed January 2, 2026, <https://www.lifestreamgroup.com/ultimate-vision-4x>
27. Shop Maximum L+Z™ with Astaxanthin by Andrew Lessman at ProCaps Labs, accessed January 2, 2026, <https://www.procapslabs.com/Products/Maximum-L-Z-with-Astaxanthin/301634/>
28. VisionREGAIN (Improved) - Lifestream Group, accessed January 2, 2026, <https://www.lifestreamgroup.com/visionregain>
29. Micro Ingredients Lutein With Zeaxanthin, 240 Softgels - Target, accessed January 2, 2026, <https://www.target.com/p/micro-ingredients-lutein-with-zeaxanthin-240-softgels/-/A-1002978377>
30. Astaxanthin Eye Health Benefits: A Powerful Antioxidant - Swanson, accessed January 2, 2026, <https://www.swansonvitamins.com/blogs/articles/astaxanthin-benefits-for-eye-health-an-antioxidant-you-need-but-probably-cant-pronounce>
31. Micro Ingredients Astaxanthin 12mg with MCT Oil, 120 Softgels, 4 Month Supply | Premium Astaxanthin Antioxidant Supplements\* | Fresh Microalgae Source | Triple Strength, Non-GMO, Gluten Free, No Soy - Tamaño 120 Count (Pack of 1) | Pacifiko Guatemala, accessed January 2, 2026, <https://www.pacifiko.com/compras-en-linea/astaxanthin-12mg-120-softgels-4-month-supply-premium-astaxanthin-antioxidant-supplements-fresh-microalgae-source-supports-eye-joint-internal-circulation-health-easy-to-swallow&pid=MGE3M2MwYz>
32. Page 1 - Reviews - Micro Ingredients, Astaxanthin , 12 mg, 120 Softgels - iHerb, accessed January 2, 2026, <https://hg.iherb.com/r/micro-ingredients-astaxanthin-12-mg-120-softgels/148176>
33. Page 1 - Reviews - Micro Ingredients, Astaxanthin, 12 mg, 120 Softgels - iHerb Singapore, accessed January 2, 2026, <https://sg.iherb.com/r/micro-ingredients-astaxanthin-12-mg-120-softgels/148176>
34. LABO Nutrition VisionREGAIN 30 softgels - Woods Pharmacy Singapore, accessed January 2, 2026, <https://woodsparmacy.com.sg/products/visionregain-30-softgels>
35. Ultimate Vision PRO 4X - Lutein Eye Supplement - AFC Japan - Lifestream Group, accessed January 2, 2026, <https://www.lifestreamgroup.com/ultimate-vision-pro-4x>
36. Life Extension® Eye Pressure Support with Mirtogenol® Vegetarian Capsules, 30 ct - Kroger, accessed January 2, 2026, <https://www.kroger.com/p/life-extension-eye-pressure-support-with-mirtogenol-vegetarian-capsules/0073787015143>
37. Eye Pressure Support with Mirtogenol | Fullscript, accessed January 2, 2026,

- <https://fullscript.com/catalog/products/eye-pressure-support-30-vcaps>
38. Nature's Way Ginkgold Eyes Advanced Ginkgo Extract Dietary Supplement Tablets - Hy-Vee, accessed January 2, 2026,  
<https://www.hy-vee.com/aisles-online/p/890775/Natures-Way-Ginkgold-Eyes-Advanced-Ginkgo-Extract-Dietary-Supplement-Tablets>
39. NEW AGE Eye Health Vitamins with Bilberry 300mg Lutein & Zeaxanthin 40mg Lycopene 40mg Resveratrol 100mg Grape Seed Extract 200mg Astaxanthin - Noon, accessed January 2, 2026,  
<https://www.noon.com/uae-en/new-age-eye-health-vitamins-with-bilberry-300-mg-lutein-zeaxanthin-40mg-lycopene-40mg-resveratrol-100mg-grape-seed-extract-200mg-astaxanthin-eye-vitamin-120-count/Z014A6174D3B87A640B31Z/p/>
40. NEW AGE Eye Health Vitamins with Bilberry 300mg Martinique | Ubuy, accessed January 2, 2026,  
<https://www.ubuy.mq/en/product/JAZB3QXVK-eye-health-vitamins-with-bilberry-6000mg-lutein-zeaxanthin-40mg-lycopene-40mg-resveratrol-3000mg-grape-seed-extract-6000mg-astaxanthin-eye>
41. Nature's Way Ginkgold Eyes 60 mg 60 Vegan Tabs - Swanson, accessed January 2, 2026,  
<https://www.swansonvitamins.com/p/natures-way-ginkgold-eyes-60-tabs>
42. Ginkgold® Eyes | Nature's Way®, accessed January 2, 2026,  
<https://naturesway.com/products/ginkgold-eyes>
43. Verdeherb Eyebright Herb Eye Health Drops, Bilberry & Lutein India | Ubuy, accessed January 2, 2026,  
<https://www.ubuy.co.in/product/JO1A1QHN8-verdeherb-eye-health-liquid-drops-natural-herbal-extract-for-eye-strain-relief-sight-care-support-non-gmo-vegan-alcohol-free>
44. Vitamatic Eye Health Gummies with Lutein, Zeaxanthin, Vitamin C, E & Zinc – Mixed Berry Flavor – 60 Gummies –Non-GMO, Gluten-Free - Walmart, accessed January 2, 2026,  
<https://www.walmart.com/ip/Vitamatic-Eye-Health-Gummies-with-Lutein-Zeaxanthin-Vitamin-C-E-Zinc-Mixed-Berry-Flavor-60-Gummies-Non-GMO-Gluten-Free/16681550544>
45. MacuGuard Ocular Support with Saffron - Supports Healthy Vision (60 Softgels) by Life Extension at the Vitamin Shoppe, accessed January 2, 2026,  
<https://www.vitaminshoppe.com/p/life-extension-super-zeaxanthin-w-lutein-meso-zeaxanthin-c3g-60-softgels/ux-1003>
46. Micro Ingredients Lutein & Zeaxanthin 40mg, 240 Softgels w/ Astaxanthin, Omega-3 | eBay, accessed January 2, 2026,  
[https://www.ebay.com/itm/326121244182?chn=ps&mkevt=1&mkcid=28&google\\_free\\_listing\\_action=view\\_item](https://www.ebay.com/itm/326121244182?chn=ps&mkevt=1&mkcid=28&google_free_listing_action=view_item)
47. Eye Pressure Support with Mirtogenol, 30 Vegetarian Capsules - iHerb, accessed January 2, 2026,  
<https://www.iherb.com/pr/life-extension-eye-pressure-support-with-mirtogenol-30-vegetarian-capsules/37312>