LiposoMore® – Advanced Liposomal Ingredients
Delivering Premium Nutrition Through Science & Innovation

A Liposomal Brand Exclusively Owned by
Joyful Nutritional Supply Co.,ltd.

Technical Monograph and Product Specification: LiposoMore™ Liposomal Alpha Lipoic Acid Powder

1. Executive Summary: Redefining Antioxidant Delivery

In the contemporary landscape of functional nutrition and nutraceutical development, the industry stands at a critical inflection point. The market has shifted from a volume-based commodity model to a value-based efficacy model, where the primary differentiator is no longer the concentration of the active ingredient, but its bioavailability and physiological impact. **Joyful Nutritional Supply Co., Ltd.**, through its flagship ingredient brand **LiposoMore™**, addresses this paradigm shift with **LiposoMore™ Liposomal Alpha Lipoic Acid Powder**, a next-generation therapeutic ingredient designed to overcome the inherent pharmacokinetic limitations of traditional antioxidants.

Alpha Lipoic Acid (ALA), often hailed as the "universal antioxidant," is indispensable in cellular energetics and oxidative defense. However, its therapeutic potential has historically been constrained by poor solubility, rapid hepatic metabolism, and gastric instability.[1] Conventional oral administration often results in erratic plasma concentrations, limiting its efficacy in managing metabolic syndrome, diabetic neuropathy, and age-related cognitive decline.[3]

This technical monograph provides an exhaustive analysis of LiposoMore™ Liposomal ALA. It synthesizes rigorous physicochemical data derived from our Certificate of Analysis (COA) with broader scientific literature to demonstrate the superiority of our phospholipid-encapsulation technology. The document details the structural integrity of our liposomal carriers, the

manufacturing precision that ensures a high-assay powder (>85% active loading), and the regulatory compliance that guarantees safety and market access.[5]

By integrating advanced lipid-based drug delivery systems (LBDDS) into a stable, free-flowing powder, Joyful Nutritional Supply offers product developers a versatile, high-potency ingredient. This report serves as a definitive guide for formulators, quality assurance professionals, and procurement specialists seeking to leverage the LiposoMore™ advantage in their next breakthrough formulation.

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2. Corporate Identity and Brand Heritage

2.1 Joyful Nutritional Supply Co., Ltd.: Innovation in Ingredients

Located in the technological hub of Shenzhen, **Joyful Nutritional Supply Co., Ltd.** has established itself as a premier architect of nutritional solutions.[6] Unlike traditional trading houses that simply move commodities, Joyful Nutritional Supply operates at the intersection of biotechnology and supply chain excellence. The company's mission is grounded in the principle that nutritional interventions must be both accessible and biologically effective.

Our operational framework is built upon three pillars:

1. **Scientific Sourcing:** We rigorously validate raw materials, ensuring that the Alpha Lipoic Acid used is of the highest purity and that the phospholipid sources are non-GMO and chemically stable.[7]
2. **Advanced Processing:** We utilize proprietary encapsulation methodologies that protect sensitive active ingredients from environmental and biological degradation.
3. **Global Compliance:** Our commitment to quality is evidenced by strict adherence to international standards, ensuring our ingredients meet the safety requirements of markets in North America, Europe, and Asia.[6]

2.2 The LiposoMore™ Technology Platform

LiposoMore™ is not merely a brand name; it represents a specific technological standard in liposomal manufacturing. While the term "liposomal" is often used loosely in the industry to describe simple emulsions, LiposoMore™ ingredients are characterized by true vesicular structures.[8]

The LiposoMore™ advantage lies in the structural integrity of the liposome. We employ a distinct manufacturing process that creates stable, unilamellar or multilamellar vesicles. These vesicles are composed of a phospholipid bilayer—typically derived from high-grade sunflower or soy lecithin—which encapsulates the therapeutic payload.[11]

For Alpha Lipoic Acid, the LiposoMore™ technology addresses specific physicochemical

challenges:

- **Hydrophobic/Hydrophilic Interface:** ALA is amphiphilic but has solubility challenges. The LiposoMore™ matrix ensures uniform dispersion and prevents recrystallization of the active ingredient.[1]
- **Thermal and Oxidative Stability:** By enveloping the dithiol ring of ALA within a lipid matrix, we significantly retard the polymerization and oxidation reactions that typically degrade free ALA powders.[2]
- **Sensory Neutralization:** The lipid encapsulation effectively masks the characteristic sulfurous odor and localized gastric irritation associated with high-dose ALA, improving consumer compliance.[4]

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3. Scientific Rationale: The Biochemistry of Alpha Lipoic Acid

To appreciate the value of the LiposoMore™ delivery system, one must first understand the unique biochemical profile of the active ingredient and the physiological barriers it must overcome.

3.1 The Universal Antioxidant

Alpha Lipoic Acid (1,2-dithiolane-3-pentanoic acid) is a naturally occurring organosulfur compound synthesized in the mitochondria from octanoic acid.[3] It functions as an essential cofactor for several mitochondrial enzyme complexes involved in energy metabolism, specifically:

- **Pyruvate Dehydrogenase Complex (PDC):** Converting pyruvate to acetyl-CoA.
- **Alpha-Ketoglutarate Dehydrogenase (KGDH):** A key step in the Krebs cycle.

ALA is unique among antioxidants because it retains potent free-radical scavenging activity in both its oxidized form (ALA) and its reduced form (Dihydrolipoic Acid, or DHLA).[14] Furthermore, it is amphiphilic—soluble in both water and fat—allowing it to provide oxidative protection across all cellular compartments, from the cytosol to the plasma membrane.[15]

3.2 Pharmacokinetic Limitations of Conventional ALA

Despite its therapeutic promise, the clinical utility of standard crystalline ALA is hampered by significant pharmacokinetic hurdles:

1. **Short Half-Life:** Free ALA has a plasma half-life of approximately 30 minutes. It is rapidly cleared by the kidneys, making it difficult to maintain therapeutic levels without frequent dosing.[3]
2. **Gastric Instability:** The harsh acidic environment of the stomach (pH 1.5–3.5) can induce the degradation of ALA. The dithiol ring is sensitive to acid-catalyzed

polymerization, which renders the molecule biologically inactive before it even reaches the absorption sites in the small intestine.[12]

3. **First-Pass Metabolism:** Upon absorption, free ALA is transported via the portal vein directly to the liver. Hepatic extraction is extensive, meaning a large fraction of the dose is metabolized and excreted before reaching peripheral tissues (nerves, skin, heart).[2]
4. **Gastric Irritation:** High doses of free ALA (600mg+) are notorious for causing dose-dependent gastrointestinal distress, including acid reflux, nausea, and abdominal pain, often leading to discontinuation of therapy.[4]

3.3 The Liposomal Solution

Liposomal encapsulation fundamentally alters the absorption kinetics of ALA. A liposome is a spherical vesicle with a membrane composed of a phospholipid bilayer.

3.3.1 Mechanism of Enhanced Bioavailability

The LiposoMore™ system improves bioavailability through three distinct mechanisms:

- **Protection (The Trojan Horse Effect):** The phospholipid bilayer is resistant to gastric acid and digestive enzymes. It acts as a shield, carrying the ALA payload intact through the stomach and into the duodenum.[4]
- **Lymphatic Absorption:** Unlike water-soluble compounds that enter the portal vein, lipid-based vehicles like liposomes can stimulate chylomicron formation or be absorbed directly into the lymphatic system via the M-cells of Peyer's patches. This route bypasses the liver entirely, avoiding the "first-pass effect" and depositing the active ingredient directly into the systemic blood circulation via the thoracic duct.[11]
- **Cellular Fusion:** Once in circulation, the phospholipid composition of the liposome allows it to fuse seamlessly with cell membranes, which are also lipid-based. This facilitates the intracellular delivery of ALA, depositing it directly into the cytoplasm where it can migrate to the mitochondria.[11]

Scientific literature supports the premise that liposomal formulations can significantly increase the Cmax (maximum concentration) and AUC (area under the curve) of amphiphilic compounds compared to standard oral powders.[18]

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4. Product Specifications and Quality Standards

The following technical data is derived directly from the manufacturing protocols and the specific Certificate of Analysis (COA) for LiposoMore™ Liposomal Alpha Lipoic Acid Powder. These specifications represent the gold standard for quality, safety, and consistency.

4.1 General Product Information

Attribute	Detail
Product Name	Liposomal Alpha Lipoic Acid Powder [5]
Brand	LiposoMore™
Active Ingredient	Alpha Lipoic Acid (Thioctic Acid)
Chemical Formula	$C_8H_{14}O_2S_2$ [1]
Molecular Weight	206.33 g/mol [20]
CAS Number	1077-28-7 (Active) [20] / 1200-22-2 (Liposomal Reference) [1]
Grade	Food Supplements Grade [5]
Country of Origin	China (Manufacturing by Joyful Nutritional Supply Co., Ltd.) [5]

4.2 Organoleptic and Physical Properties

The physical characteristics of the powder are critical for formulators ensuring uniformity in capsules or blends.

Parameter	Specification	COA Result	Method/Significance
Appearance	Yellowish powder	Pass [5]	Visual inspection. Indicates proper encapsulation; dark brown or sticky powder may indicate degradation.
Odor	Odorless	Pass [5]	Organoleptic. A key advantage; raw ALA has a pungent,

			sulfurous smell. LiposoMore™ masks this effectively.
Solubility	Dispersible in water	Pass [5]	Critical for liquid sachet or drink mix applications. The powder forms a suspension/emulsion upon rehydration.
Bulk Density	0.40 – 0.60 g/mL (Typical)	N/A	Essential for calculating capsule fill weights and blender capacity.[21]
Particle Size	100% thru 40 Mesh	N/A	Ensures flowability and mixability.[21]

4.3 Chemical Specifications (Potency & Purity)

High encapsulation efficiency and assay are the hallmarks of LiposoMore™. While many market alternatives offer 50% loading, LiposoMore™ achieves a highly concentrated matrix.

Parameter	Specification	COA Result	Method
Assay (ALA Content)	> 85.0%	**91.0%** [5]	HPLC. High potency allows for smaller capsule sizes and lower cost-in-use per active gram.
Loss on Drying	< 10.0%	**3.2%** [5]	Gravimetric (105°C). Low moisture is crucial for preventing lipid hydrolysis and microbial growth

			during shelf life.
Encapsulation Efficiency	High Efficiency Matrix	N/A	The manufacturing process ensures the ALA is integral to the lipid matrix.

4.4 Heavy Metal Profile

Safety is paramount. Joyful Nutritional Supply employs ICP-MS (Inductively Coupled Plasma Mass Spectrometry) to detect heavy metals at trace levels, adhering to stringent international safety standards.

Contaminant	Specification	COA Result	Compliance Note
Total Heavy Metals	< 10 ppm	< 10 ppm [5]	Complies with USP/EU limits for food supplements.
Lead (Pb)	< 3 ppm	< 3 ppm [5]	Complies with Prop 65 (dosage dependent) and FCC.
Mercury (Hg)	< 0.1 ppm	< 0.1 ppm [5]	Below detectable limits; critical for marine-sourced ingredients, verified absent here.
Cadmium (Cd)	< 1.0 ppm	< 1.0 ppm [5]	Strictly controlled due to kidney toxicity risks.
Arsenic (As)	≤ 1.0 ppm	< 1.0 ppm [5]	Compliant with global safety standards.

4.5 Microbiological Analysis

Given the organic nature of phospholipids, microbiological control is a critical quality attribute. The low water activity of the powder naturally inhibits growth, but rigorous testing ensures hygiene.

Parameter	Specification	COA Result	Method
Total Plate Count	≤ 1000 cfu/g	< 100 cfu/g [5]	USP . Indicates excellent sanitary manufacturing conditions.
Yeasts & Molds	≤ 100 cfu/g	< 10 cfu/g [5]	USP . Low counts prevent spoilage.
E. Coli	Negative / 1g	Negative [5]	USP . Pathogen screen.
Salmonella	Negative / 25g	Negative [5]	USP . Pathogen screen.
Staphylococcus Aureus	Negative / 25g	Negative [5]	Pathogen screen.

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5. Regulatory Compliance and Certifications

Navigating the regulatory landscape is essential for global product launches. LiposoMore™ Liposomal ALA is manufactured in accordance with strict regulatory guidelines to facilitate seamless market entry.

5.1 Compliance Statements

- **Non-GMO Statement:** The product is manufactured without the use of genetically modified organisms. The phospholipid carrier (Lecithin) is sourced from certified Identity Preserved (IP) non-GMO sunflower or soy crops.[7]
- **Gluten-Free:** The manufacturing line is free from gluten-containing grains (wheat, barley, rye). The product meets the FDA and EU definition of Gluten-Free (<20 ppm), making it suitable for Celiac-friendly formulations.[22]
- **BSE/TSE Free:** No animal-derived materials prone to Transmissible Spongiform Encephalopathies (TSE) or Bovine Spongiform Encephalopathy (BSE) are used. The ALA

is synthetic or fermentation-based, and lipids are plant-based.
- **Vegan/Vegetarian:** The product contains no animal by-products and is suitable for vegan and vegetarian diets.
- **Residual Solvents:** Complies with USP and EU Directive 2009/32/EC regarding residual solvents (ethanol/water used in processing are removed to safe limits).
- **Irradiation:** The product is not treated with ionizing radiation.[11]
- **Allergen Status:** If Sunflower Lecithin is used, the product is allergen-free. If Soy Lecithin is used, it is labeled accordingly, though the purification process typically removes the allergenic proteins. (Standard LiposoMore formulation typically utilizes Sunflower to support "Allergen Free" claims).

5.2 Regulatory Status of Ingredients

- **Alpha Lipoic Acid:** Has Generally Recognized As Safe (GRAS) status (self-affirmed) in the United States and is a permitted food supplement ingredient in the European Union (Directive 2002/46/EC) and major Asian markets.
- **Phospholipids (Lecithin):** GRAS listed (21 CFR 184.1400) and an approved food additive in the EU (E322).

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6. Manufacturing and Quality Assurance

The reliability of LiposoMore™ stems from a robust manufacturing process that balances efficiency with the delicate nature of liposomal structures.

6.1 The Manufacturing Process

1. **Dissolution and Mixing:** High-purity Alpha Lipoic Acid is dissolved in a solvent system alongside phospholipids.
2. **Vesicle Formation:** Through controlled hydration and high-shear homogenization or microfluidization, the lipids self-assemble into bilayers, entrapping the ALA active within the core or the membrane bilayer.[4]
3. **Particle Size Reduction:** The liposomal suspension is processed to achieve a uniform particle size distribution (typically nanometric in liquid phase), ensuring optimal bioavailability.[26]
4. **Drying (Lyophilization/Spray Drying):** The liquid liposomes are converted into a dry powder. This is a critical step; improper drying can rupture liposomes. Joyful Nutritional Supply uses advanced drying technologies that preserve the phospholipid structure, allowing the liposomes to reconstitute upon contact with water in the GI tract.[27]
5. **Sieving and Blending:** The powder is sieved to ensure a consistent mesh size (typically 40 mesh) for flowability.

6.2 Quality Control

Each batch undergoes a comprehensive battery of tests:

- **Identification:** FTIR spectroscopy to confirm chemical identity.[25]
- **Assay:** HPLC to verify >85% ALA content.
- **Heavy Metals:** ICP-MS for trace element analysis.
- **Microbiology:** USP standard testing.
- **Stability Testing:** Accelerated and real-time stability studies ensure the product maintains potency over its 24-month shelf life.

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7. Applications and Formulation Guidelines

LiposoMore™ Liposomal ALA Powder offers exceptional versatility for product developers. Its stability, high potency, and neutral sensory profile make it superior to liquid liposomes or raw ALA.

7.1 Recommended Dosage Forms

- **Capsules (Hard Shell):** This is the ideal application. The high bulk density (approx. 0.5 g/mL) and high assay (91%) allow for potent doses (e.g., 300mg or 600mg ALA) in a standard Size 0 or Size 00 capsule. Unlike liquid liposomes that require expensive softgels or liquid-fill capsules, LiposoMore™ powder runs smoothly on standard encapsulation machines.[11]
- **Powdered Drink Mixes / Stick Packs:** The powder is dispersible in water. It can be flavored and sweetened to create a "Beauty from Within" or "Metabolic Support" drink mix. The liposomal coating masks the burning sensation of raw ALA.[11]
- **Functional Foods:** Can be incorporated into bars, gummies, or meal replacements. The thermal stability of the powder allows it to withstand standard confectionery processing temperatures better than non-encapsulated actives.
- **Cosmetics (Topical):** Liposomal ALA is highly prized in anti-aging creams for its ability to penetrate the dermis. The powder can be reconstituted into lotions or serums.[29]

7.2 Dosage Recommendations

- **General Antioxidant Support:** 100 – 300 mg per day.
- **Metabolic/Glucose Support:** 300 – 600 mg per day.
- **Neurological Support:** 600 – 1200 mg per day (divided doses recommended).
- *Note:* Due to enhanced bioavailability, lower doses of LiposoMore™ may achieve therapeutic effects comparable to higher doses of standard ALA.

7.3 Formulation Compatibility

- **Synergy:** ALA works synergistically with Acetyl-L-Carnitine (for mitochondrial energy) and CoQ10. LiposoMore™ powder blends well with these ingredients.[30]

- **Excipients:** Compatible with standard flow agents (silicon dioxide, magnesium stearate) and fillers (microcrystalline cellulose, rice flour).

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8. Health Benefits: The Clinical Edge

Incorporating LiposoMore™ into your product line allows for compelling, science-backed health claims (subject to local regulations).

8.1 Metabolic Health and Blood Sugar Control

ALA improves insulin sensitivity by enhancing the recruitment of GLUT4 glucose transporters to the cell membranes of muscle and fat tissue. This facilitates the uptake of glucose from the bloodstream, supporting healthy blood sugar levels. Clinical trials have demonstrated that liposomal ALA is particularly effective in managing metabolic syndrome parameters.[2]

8.2 Neuroprotection and Nerve Health

Oxidative stress is a primary driver of diabetic neuropathy and neurodegenerative disorders. ALA can cross the blood-brain barrier (BBB). Liposomal delivery enhances this neural uptake. It reduces oxidative damage to nerves, potentially alleviating symptoms of neuropathy such as pain, burning, and numbness.[2]

8.3 Skin Health and Anti-Aging

Oxidative stress and glycation are two main causes of skin aging.

- **Anti-Oxidation:** ALA neutralizes ROS generated by UV radiation.
- **Anti-Glycation:** It prevents the cross-linking of collagen fibers caused by sugars (Advanced Glycation End-products), keeping skin elastic and reducing wrinkle formation.[2]
- **Cellular Renewal:** By recycling Vitamin C and Glutathione, ALA supports the body's internal repair mechanisms.

8.4 Heavy Metal Chelation

ALA acts as a natural chelating agent, binding to toxic metals like mercury, lead, and arsenic and facilitating their excretion. This supports liver detoxification pathways.[12]

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9. Storage, Packaging, and Stability

The stability of liposomal products is a common concern. Joyful Nutritional Supply utilizes advanced processing to ensure LiposoMore™ powder remains stable under recommended conditions.

9.1 Packaging Specifications

To protect the hygroscopic nature of the ingredients and the integrity of the lipids:

- **Standard Pack Size:** 10kg or 25kg net weight.
- **Container:** Heavy-duty fiber drums.
- **Inner Liner:** Double-layered food-grade Low-Density Polyethylene (LDPE) bags, heat-sealed to prevent moisture ingress and oxidation.[32]
- **Desiccant:** Silica gel packets may be included between liners to control headspace humidity.

9.2 Storage Conditions

- **Temperature:** Store in a cool place, preferably between **15°C and 25°C (59°F - 77°F)**. While the powder is shelf-stable at room temperature, avoiding excessive heat protects the lipid bilayer from melting or oxidation.[20]
- **Humidity:** Store in a dry environment (Relative Humidity < 60%). ALA is hygroscopic; exposure to moisture can cause clumping.
- **Light:** Protect from direct sunlight and strong UV sources, which can catalyze lipid oxidation.
- **Shelf Life: 24 months** (2 years) from the date of manufacture when stored in unopened, original packaging.[5]

9.3 Retesting

If stored beyond the retest date (2 years), the product should be analyzed for Assay and Peroxide Value (to check lipid quality) before use.

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10. Conclusion

LiposoMore™ Liposomal Alpha Lipoic Acid Powder represents the convergence of nature's most potent antioxidant with the forefront of biotechnological delivery systems. By addressing the critical flaws of standard ALA—solubility, stability, and bioavailability—Joyful Nutritional Supply Co., Ltd. empowers brand owners to deliver superior health outcomes to their consumers.

With a guaranteed assay of >85%, rigorous safety testing, and a manufacturing process designed for stability, LiposoMore™ is the definitive choice for premium metabolic, neuroprotective, and anti-aging formulations.

Trust in Science. Trust in LiposoMore™.

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