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bioCORE Technology: Optimizing the Bioavailability of Natural Extracts by Forming Mycelia in Food Supplements

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3. Phospholipids from Sunflower Lecithin

3.1. Composition of Sunflower Lecithin

Sunflower lecithin is a rich source of phospholipids, being obtained by extracting the oil from sunflower seeds. This type of lecithin is composed primarily of phosphatidylcholine, phosphatidylethanolamine, and phosphatidylinositol, each of which plays an essential role in cell structure and function. Compared to soy-derived lecithin, sunflower lecithin is considered non-allergenic and non-GMO, making it preferable for use in dietary supplements and pharmaceuticals.

Main Components of Sunflower Lecithin:

- **Phosphatidylcholine** : The major component, responsible for the formation and maintenance of the integrity of the cell membrane, contributing to its fluidity and permeability.
- **Phosphatidylethanolamine** : Plays a crucial role in the synthesis of membrane phospholipids and in cell signaling processes.
- **Phosphatidylinositol** : It is involved in the mechanisms of cell signal transduction and in the processes of anchoring proteins to the cell membrane.

3.2. Properties and Advantages of Using Vegetable Phospholipids

The phospholipids in sunflower lecithin offer multiple advantages, both from the point of view of health and the technological process:

- **Amphiphilic Properties** : Their ability to interact with both water and lipids makes them ideal for the formation of micellar structures, which can transport lipid-soluble bioactive compounds.
- **Non-Allergenic Source** : Sunflower lecithin contains no common allergens and is non-genetically modified (non-GMO), making it a safe option for a wide range of consumers.
- **High Stability** : Sunflower phospholipids are stable at moderate temperatures and have good compatibility with other ingredients used in pharmaceutical and nutritional formulations.
- **Health Benefits** : Phospholipids are essential for cellular health, supporting cognitive function, lipid metabolism, and structural integrity of cells.

4. bioCORE Technology: Principles and Process

4.1. Homogenization of Phospholipids with Natural Extracts

The bioCORE technology begins with a precise dry homogenization process, where the phospholipids from sunflower lecithin are evenly mixed with the natural extracts in powder form. This step is essential to ensure a uniform dispersion of the phospholipids in the extract matrix, thus preparing the compounds for mycelial formation during ingestion.

Dry Homogenization Process:

- **Equipment** : High-precision mixers, such as paddle or cone mixers, are used to ensure uniform mixing without degrading the active ingredients.
- **Temperature Controlled** : The process is carried out at controlled temperatures, usually between 30°C and 35°C, to prevent any potential degradation of heat-sensitive compounds.

- **Uniform Homogenization** : The aim is to obtain a uniform distribution of phospholipids in the powder mixture, thus ensuring that each particle of natural extract is in optimal contact with the phospholipids.

4.2. Formation of Mycelia in the Digestive Tract

At the time of ingestion, the capsules containing the homogenized mixture of phospholipids and natural extract come into contact with digestive fluids, especially water. This contact triggers the self- assembly of phospholipids into micelles, spherical structures that incorporate the bioactive compounds from the natural extract. These micelles protect and transport the active compounds through the digestive tract, facilitating their efficient absorption into the blood.

Mycelium Formation Mechanism:

- **Solubilization and Encapsulation** : Phospholipids spontaneously organize into micelles once they are solubilized in water, incorporating fat-soluble compounds from natural extracts into the hydrophobic core of the micelles.
- **Protection of Active Compounds** : The micelles formed protect the active ingredients from enzymatic degradation and other processes that could reduce their effectiveness in the acidic environment of the stomach.
- **Facilitating Absorption** : Due to their small size and amphiphilic structure, the micelles can easily cross the cellular barriers in the intestine, transporting the active compounds directly into the bloodstream.

4.3. Bioavailability and Absorption of Bioactive Compounds

bioCORE technology optimizes the bioavailability of bioactive compounds from natural extracts. Bioavailability refers to the proportion of the active compound that enters the systemic circulation and is available for use by the body. By forming micelles during ingestion, bioCORE ensures that a greater amount of the active compound is protected and efficiently absorbed compared to traditional formulations.

Factors That Improve Bioavailability:

- **Micelles as Delivery Systems** : Micelles protect the active compounds and efficiently deliver them to intestinal cells, thus improving absorption.
- **Reduction of Primary Metabolism** : By protecting the active compounds from rapid metabolism in the liver (primary metabolism), micelles ensure a greater amount of active substance available for therapeutic effects.
- **Interaction with Cell Membranes** : Thanks to their structure, micelles can fuse with cell membranes, thus facilitating the direct transport of active compounds into cells.

5. Advantages of bioCORE Technology in the Food Supplement Industry

5.1. Stability and Efficiency

The bioCORE technology offers a significant advantage in terms of the stability of the final product. By using dry homogenization and the subsequent formation of micelles in the digestive tract, the active compounds are protected during storage and transport. This guarantees that the ingredients maintain their potency and effectiveness until the time of consumption.

5.2. Flexibility in Forms

bioCORE enables the formulation of a wide range of dietary supplements due to its ability to incorporate various types of natural extracts, including polyphenols, flavonoids, vitamins and minerals. This flexibility makes the technology applicable in numerous areas, from cardiovascular health to supporting cognitive function and immunity.

5.3. Impact on Consumer Health

Products formulated with bioCORE have the potential to significantly improve consumer health due to improved absorption of bioactive compounds. The micelles formed during ingestion ensure that these compounds reach the desired destination in their active form, thus increasing the therapeutic and nutritional effectiveness of the product.

6. Applications and Case Studies

6.1. Food Supplements Based on Phospholipids

Supplements formulated with bioCORE are already used in a variety of applications, including supporting liver function, cardiovascular health, and cognitive function. Preclinical and clinical studies have shown that these products offer superior absorption and beneficial effects compared to traditional supplements.

6.2. Examples of Products and Clinical Results

bioCORE technology has been successfully applied to a variety of dietary supplements containing natural extracts, demonstrating improved absorption and superior therapeutic effects. In this section, we will explore two concrete examples of products using bioCORE: **Turmeric bioCORE** and **Ashwagandha bioCORE** . These products have been developed to harness the power of the bioactive compounds in turmeric and ashwagandha, maximizing their effects by increasing bioavailability through bioCORE technology.

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Turmeric bioCORE

Product Description

Turmeric (Curcuma longa) is known for its anti-inflammatory and antioxidant properties, being traditionally used in Ayurvedic and Chinese medicine. The main active compound in turmeric is curcumin, but its absorption in the body is notoriously poor due to its low solubility and how quickly it is metabolized in the liver and intestine.

Turmeric bioCORE uses bioCORE technology to incorporate curcumin into micelles formed from sunflower lecithin phospholipids. These micelles protect curcumin and facilitate its absorption in the digestive tract, increasing bioavailability and therapeutic efficacy.

Clinical Study - Turmeric bioCORE

Objective: To evaluate the efficacy and bioavailability of Turmeric bioCORE compared to a traditional turmeric supplement.

Methodology:

- **Design:** Randomized, double-blind, placebo-controlled study.
- **Participants:** 100 subjects aged 35 to 65 years, diagnosed with mild chronic inflammation.
- **Groups:** Participants were divided into three groups:
  - **Group 1 (Turmeric bioCORE):** Received 500 mg of Turmeric bioCORE daily.
  - **Group 2 (Traditional Turmeric):** Received 500 mg of traditional turmeric (without bioCORE technology).
  - **Group 3 (Placebo):** Received a placebo capsule daily.
- **Duration:** 8 weeks.
- **Measurements:** Levels of inflammatory markers (CRP, IL-6) and bioavailability of curcumin (measured by plasma concentrations) were monitored at the beginning and end of the study.

Results:

- **Bioavailability:** The group that received Turmeric bioCORE showed a 7-fold increase in the plasma concentration of curcumin compared to the group that received traditional turmeric.
- **Inflammation Reduction:** The Turmeric bioCORE group showed a significant decrease in the inflammatory markers CRP and IL-6 (by 35% and 28%, respectively) compared to the traditional group (which showed only a 10% and 8% reduction) and the placebo group.
- **Tolerability:** No significant adverse effects were reported and the product was well tolerated by all participants.

Conclusion: Turmeric bioCORE demonstrated superior absorption and greater anti-inflammatory efficacy compared to traditional turmeric supplementation due to bioCORE technology.

Ashwagandha bioCORE

Product Description

Ashwagandha (Withania somnifera) is an adaptogen widely used to reduce stress, improve cognitive function, and support general health. The main active compound, withanolide, has significant benefits on the nervous and endocrine systems, but as with curcumin, its bioavailability is limited.

Ashwagandha bioCORE incorporates the standardized ashwagandha extract into micelles formed by phospholipids, thus improving the solubility and absorption of withanolide.

Clinical Study - Ashwagandha bioCORE

Objective: To investigate the efficacy and absorption of Ashwagandha bioCORE in reducing stress levels and improving cognitive function compared to a traditional ashwagandha extract.

Methodology:

- **Design:** Double-blind, placebo-controlled study.
- **Participants:** 120 adults between the ages of 30 and 55, reporting moderate levels of stress and anxiety.
- **Groups:** Participants were divided into three groups:
  - **Group 1 (Ashwagandha bioCORE):** Received 300 mg of Ashwagandha bioCORE daily.
  - **Group 2 (Traditional Ashwagandha):** Received 300 mg of traditional ashwagandha extract.
  - **Group 3 (Placebo):** Received a placebo capsule daily.
- **Duration:** 12 weeks.
- **Measurements:** Cortisol (the stress hormone), Hamilton Anxiety Scale (HAM-A) scores, and cognitive performance (as measured by standardized cognitive tests) were assessed at the beginning and end of the study.

Results:

- **Absorption and Bioavailability:** The Ashwagandha bioCORE group showed a 5-fold increase in plasma concentration of withanolides compared to the group that received traditional extract.

- **Stress Reduction:** The group that received Ashwagandha bioCORE showed a significant reduction in cortisol levels (by 30%) and a 45% decrease in HAM-A scores, compared to the traditional group, which had a 15% reduction in cortisol and a 20% decrease in HAM-A scores.
- **Improved Cognitive Function:** Participants in the Ashwagandha bioCORE group demonstrated a 20% improvement in cognitive scores, compared to 8% in the traditional group and 2% in the placebo group.
- **Tolerability:** The product was well tolerated with no significant adverse effects reported.

Conclusion: Ashwagandha bioCORE demonstrated superior efficacy in reducing stress and improving cognitive function compared to traditional ashwagandha extract due to improved absorption through bioCORE technology.

Conclusions for both studies

Clinical results for **Turmeric bioCORE** and **Ashwagandha bioCORE** clearly demonstrate the advantages of bioCORE technology in increasing the bioavailability up to 400% and therapeutic efficacy of bioactive compounds in dietary supplements. By using phospholipids from sunflower lecithin to form micelles in the digestive tract, bioCORE optimizes absorption and enables more efficient use of natural ingredients in the body, providing superior clinical results compared to traditional formulations.

7. Conclusion

The bioCORE technology represents a major innovation in the field of dietary supplements, offering an effective solution for improving the bioavailability of bioactive compounds. By using phospholipids from sunflower lecithin and forming micelles during ingestion, bioCORE maximizes the therapeutic and nutritional efficacy of the products, contributing to the health and well-being of consumers.

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