

# Liposomal D Supreme designs for health®

*Vitamins D and K for immune support and bone health using liposomal technology for superior absorption and bioavailability*

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Liposomal D Supreme is a convenient and effective way to dose highly absorbable and bioavailable vitamin D for patients who need clinically relevant amounts and who may prefer to swallow fewer pills. Each 0.5 mL serving (approx. 1 pump) provides 2500 IU of vitamin D3 (cholecalciferol) along with vitamin K in the K1 and K2 forms for synergistic bone health support. This liposomal formulation has a pleasant citrus flavor and is easy to titrate for higher doses.

Although it is classified as a vitamin, vitamin D more closely resembles and functions like a steroid hormone with broad influences on physiology.<sup>1</sup> Vitamin D is widely recognized as critical for a healthy immune system and strong bones, but its functions go far beyond this, with many facets likely yet to be identified and elucidated. For example, vitamin D helps regulate phosphorus balance, is needed for cell differentiation, and may also play a role in insulin secretion.<sup>2</sup> Vitamin D receptors are found throughout the body and have been shown to influence the expression of thousands of genes.<sup>3,4</sup> Vitamin D also plays a role in the brain, influencing brain development in early life as well as brain function in adults, which may explain in part the associations between vitamin D deficiency, depressed moods and impaired cognition,<sup>5-9</sup> and the improvements some patients report in these upon vitamin D supplementation.

Most holistically oriented health care practitioners aim for vitamin D blood levels (serum 25(OH)D) of between 50-100 ng/mL as optimal. However, vitamin D deficiency (a level  $\leq$  20 ng/mL) is common, with epidemiological findings showing more than 40% of the US adult population to be deficient.<sup>10</sup> Many patients will require a higher dose of vitamin D in order to achieve this.

Several factors contribute to the high incidence of deficiency, such as avoidance of sun exposure, older age (the elderly have reduced capacity to synthesize vitamin D in skin upon exposure to UVB radiation and are more likely to stay indoors or use sunscreen), chronic kidney disease, fat malabsorption syndromes, inflammatory bowel conditions, and obesity.<sup>2</sup> Individuals with darker skin color may be genetically adapted to require more sun exposure than those with lighter skin; African American and Hispanic American individuals have higher rates of vitamin D deficiency compared to Caucasian Americans.<sup>10</sup> Additionally, modern diets are typically lower in vitamin D-rich foods that were once a more regular part of people's diets, such as fatty fish, cod liver oil and lard from pastured pigs.

Vitamin D2 (ergocalciferol) is the form typically used in food fortification, but evidence indicates that D3 is far more effective for raising and maintaining serum 25(OH)D concentration, and that D2 should not be considered equivalent.<sup>11,12</sup>

## Liposomal D Supreme may be useful for:

- Immune support
- Bone health
- Brain development
- Cognitive function and balanced moods
- Insulin secretion and glucoregulation
- Healthy blood pressure

## Supplement Facts

Serving Size 0.5 mL (approx. 1 pump)

Servings Per Container 100

Amount Per Serving		% Daily Value
Vitamin D (as Cholecalciferol)	62.5 mcg (2500 IU)	313%
Vitamin K	325 mcg	271%
(as Vitamin K1 Phytonadione 200 mcg; Vitamin K2 Menaquinone-4 [MK-4] 100 mcg; Vitamin K2 Menaquinone-7 [MK-7] 25 mcg)		

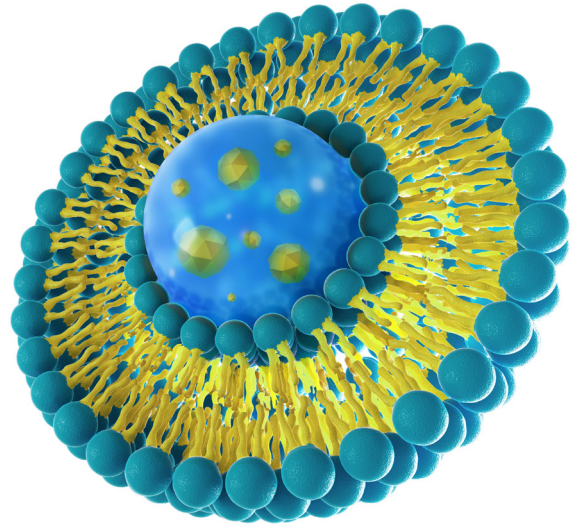
**Other Ingredients:** Water, glycerine, ethanol, vitamin E (as tocopherol and natural mixed tocopherols), phospholipids (from sunflower lecithin), natural citrus oils.



### Why include vitamin K?

Vitamin K is included in this formula, as it is essential for proper trafficking of calcium. Vitamin-K-dependent proteins orchestrate the deposition of calcium into bones and teeth while inhibiting vascular calcification. Increasing vitamin D levels via supplementation in the context of suboptimal vitamin K status may increase the risk of calcium deposition in arteries and soft tissue and have an adverse effect on arterial elasticity while simultaneously reducing bone mineralization, a situation known as “the calcification paradox” or “calcium paradox.”<sup>13,14</sup> This imbalance between vitamins D and K explains individuals with both osteoporosis and vascular calcification. The strongest known inhibitor of tissue calcification is matrix Gla protein, which is vitamin-K-dependent,<sup>15,16</sup> and osteocalcin, required for building and strengthening bone and dentin, is also vitamin K-dependent.

Liposomal D Supreme contains vitamin K as both K1 and K2. The effects of K2 are different from K1, which is better known for its influence on the clotting cascade. The body converts K1 to K2, but this conversion may not occur optimally in all individuals. Intestinal bacteria also produce K2,<sup>17</sup> but this may not be sufficient to meet the body’s needs.



**Structure of a Liposome**

### What are liposomes?

Liposomes are spheres made of phospholipids—the primary building blocks of cell membranes. Owing to this structure, liposomes bond easily with cell membranes to facilitate intracellular delivery of their nutrient cargo. Thanks to this enhanced delivery and absorption, nutrients delivered in liposomal form at lower doses may have equal or greater efficacy than higher doses provided in forms that are less bioavailable.

Designs for Health’s Liposomal D Supreme employs liposome particles that are 50-100nm in size, in contrast to 200-600nm particles that are more commonly available from other manufacturers. The smaller sized particles result in increased oral and cellular uptake and faster transmucosal absorption in the mouth, in addition to enhanced absorption throughout the rest of the gastrointestinal tract. In fact, it is recommended to hold the product in the mouth for 30 seconds before swallowing to take advantage of this effective route of absorption. Additionally, clearance of these particles from the bloodstream (via the liver and spleen) is inversely related to size: the smallest particles circulate the longest, increasing the likelihood of absorption at their target tissues. Note that the phospholipids used in this product are derived from sunflower lecithin (soy-free, non-GMO material).

### Benefits of Liposomal Delivery

- Superior absorption and intracellular delivery of nutrients
- Phospholipid structure allows for effective delivery of compounds with different solubilities carried within the same particle (e.g., water- and lipid-soluble compounds)
- Liposomes penetrate the blood-brain barrier, an obstacle for other various formulations
- While there is an opportunity for quick absorption in the mouth, liposomes also survive the acidic environment of the stomach, ensuring intestinal uptake and delivery to the lymphatic system
- Liquid liposomal formulations are convenient for those who prefer to swallow fewer pills; also allow for easy dosing

#### Recommended Use:

- As a dietary supplement, take 0.5 mL (approx. 1 pump) and hold in mouth for 30 seconds before swallowing, or as directed by your health care practitioner.
- Due to the inclusion of vitamin K in this product, use caution when using Liposomal D Supreme with patients taking Coumadin, warfarin or other anticoagulant medications.

*For a list of references cited in this document, please visit:*

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