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Liposomal Vitamin B12 1000µg

Increased bioavailability and absorption

Nutritional Information

One capsule provides:

		*%NRV
Liposomal Vitamin B12 (methylcobalamin)	333 mg	
Providing		
Vitamin B12	1000 µg	40000

*Nutrient Reference Values

Take one capsule daily with food. Swallow with water.



SUMMARY

- Advanced delivery of oral vitamin B12.
- Methylcobalamin form of vitamin B12.
- High bioavailability and absorption of vitamin B12.
- Increased cellular delivery of vitamin B12.
- Highly stable vitamin B12 and protected from degradation.
- Supported by studies and advanced manufacturing processes.

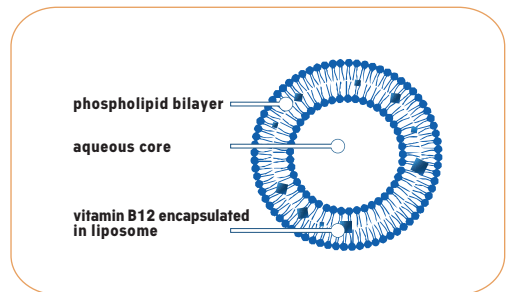
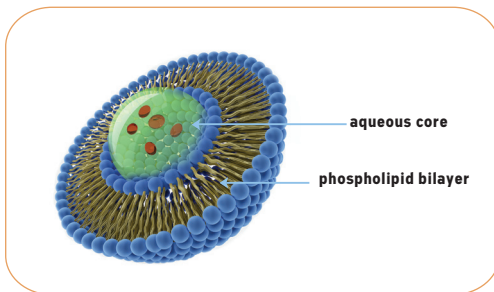
LIPOSOMES & LIPOSOMAL DELIVERY

Liposomes are nanoscale phospholipid vesicles designed to enhance intestinal absorption, intracellular delivery and systemic bioavailability of encapsulated nutrients, such as vitamin B12. Liposomes are microscopic-sized spherical envelopes or pockets containing an aqueous core. The phospholipids are arranged into a spherical cell membrane like lipid bilayer.

Liposomal technology enables the encapsulation of vitamin B12 within phospholipid vesicles, improving its stability and delivery efficiency. The liposomal vitamin B12 is created through a careful manufacturing process resulting in an innovative delivery form with significant advantages for the consumer.

Vitamin B12 is encapsulated within the aqueous core, protected by a phospholipid bilayer that enhances stability from digestive degradation.

Illustrations of liposomal vitamin B12 structure



ADVANTAGES OF LIPOSOMAL DELIVERY OF VITAMIN B12

The functional advantages of liposomal delivery arise from the bilayer's ability to protect, transport and facilitate cellular uptake of bioactive compounds. Liposomal encapsulation provides a barrier around the active vitamin B12, increasing resistance to digestive enzymes, acidity, intestinal flora, and oxidation.¹

When encapsulated within a liposomal carrier, vitamin B12 benefits from improved gastrointestinal stability and more efficient cellular uptake. The phospholipid bilayer protects the vitamin B12 during digestion while facilitating transport across biological membranes, resulting in superior bioavailability compared with conventional formulations. In addition, interactions between the liposome's phospholipid bilayer membrane and the body's cell membranes offers enhanced cellular uptake through endosomal mechanisms.

As a result, the advantages of liposomal vitamin B12 include:

- High bioavailability and absorption of vitamin B12 compared with conventional oral forms of vitamin B12.
- Protection of vitamin B12 against the acid environment of the stomach and degradation.
- An auxiliary (intrinsic factor-independent) route of absorption, enabling effective supplementation in those with impaired B12 absorption.
- Increased intracellular delivery of vitamin B12.
- High stability of vitamin B12.
- Cost effective by being able to take a lower dose of vitamin B12 for the same effect.

LIPOSOMAL MANUFACTURING PROCESS

The Liposomal nutrients used by Quest are supplied by Liposovit® and manufactured using a carefully controlled manufacturing process and the liposome structures are additionally verified using cryogenic transmission and scanning electron microscopy. Particle size plays a vital role in nanoparticle adhesion to and interaction with biological cells in the body.^{2,3} At Quest we use Liposomal nutrients within a particle size of 200-400 nanometres (nm), ensuring they are a highly effective delivery system. The size of the liposomes and their particle size distribution are determined using a LUMiSizer® 651 particle size analyzer.

Image of Liposovit® liposome structures using cryogenic transmission electron microscopy.

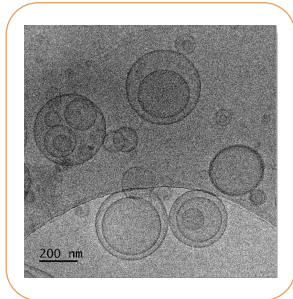
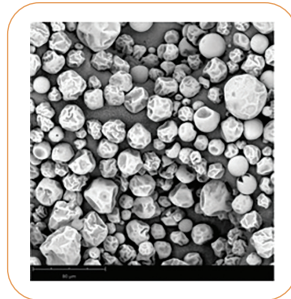


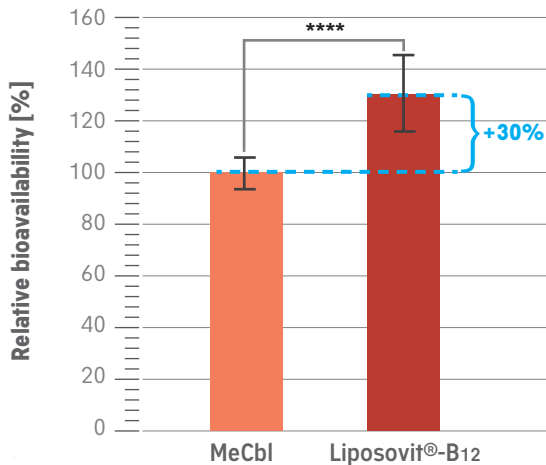
Image of Liposovit® liposome structures using x1000 magnification under scanning electron microscope.



STUDIES OF LIPOSOMAL DELIVERY OF VITAMIN B12

In an in vitro Caco-2 intestinal cell model conducted by Bart, liposomal vitamin B12 demonstrated significantly higher trans-epithelial cell transport compared with conventional methylcobalamin. Relative bioavailability was approximately **30% higher** for liposomal methylcobalamin, indicating that liposomal encapsulation can enhance bioavailability of vitamin B12 under simulated conditions.

Relative bioavailability of Liposovit-B12 determined in the Caco-2 cell line model



Values in the chart represent the average from 3 independent experiments. Statistical analysis was performed with Student's t-test, $p < 0.0001$.

Liposomal vitamin B12 may offer an additional absorption pathway beyond the body's usual intrinsic factor-dependent mechanism. Normally, vitamin B12 must bind to intrinsic factor in the stomach to be efficiently absorbed in the intestine, and this process can be impaired in some individuals. Because liposomes are tiny phospholipid carriers that can interact directly with intestinal cell membranes, they may help a portion of vitamin B12 be absorbed through membrane-mediated uptake, considered an auxiliary route of absorption. This concept is supported by the above laboratory studies showing enhanced transport of liposomal B12 across intestinal cell models.

BENEFITS OF VITAMIN B12 SUPPLEMENTATION

Vitamin B12 is an essential water-soluble vitamin that is not synthesised by the human body and must be obtained from animal-based foods or supplementation. It is required for many fundamental biochemical processes including energy metabolism, red blood cell formation, DNA synthesis and the normal function of the nervous system. Vitamin B12 is particularly critical for population groups at higher risk of deficiency, including the elderly, vegans and vegetarians, and those with gastrointestinal conditions affecting absorption.

Nervous System Function

Vitamin B12 is essential for the maintenance and repair of myelin, the protective sheath that insulates nerve fibres and ensures rapid, efficient nerve signal transmission throughout the body. B12 deficiency leads to progressive demyelination, which can manifest as peripheral neuropathy, numbness, tingling, balance disturbances, and in severe or prolonged cases, subacute combined degeneration of the spinal cord. Methylcobalamin, the specific form used in this product, is directly active in the nervous system and has been shown in clinical studies to support nerve regeneration and improve neurological symptoms associated with B12 deficiency.⁴

Energy and Fatigue

Vitamin B12 is required for the normal production of cellular energy through its role as a cofactor in the conversion of methylmalonyl-CoA to succinyl-CoA, a key step in the Krebs (TCA) cycle. B12 deficiency leads to impaired energy metabolism, resulting in fatigue, weakness and reduced physical and cognitive performance. Vitamin B12 contributes to the reduction of tiredness and fatigue and to normal energy-yielding metabolism in the body.

Red Blood Cell Formation

Vitamin B12 is essential for the normal formation and maturation of red blood cells. It works in conjunction with folate in the synthesis of DNA, which is required for the rapid cell division associated with red blood cell production in the bone marrow. B12 deficiency leads to impaired DNA synthesis, resulting in megaloblastic anaemia characterised by enlarged, dysfunctional red blood cells with a reduced capacity to carry oxygen. Symptoms include fatigue, breathlessness and pallor. Vitamin B12 contributes to normal red blood cell formation and normal function of the immune system.

Heart Health and Homocysteine

Vitamin B12 works together with folate and vitamin B6 to metabolise homocysteine, an amino acid that accumulates in the blood when B vitamin intake is inadequate. Elevated plasma homocysteine is an established independent risk factor for cardiovascular disease, stroke and cognitive decline. Clinical studies have demonstrated that supplementation with vitamin B12 can significantly reduce circulating homocysteine levels, contributing to cardiovascular protection.^{5,6}

Cognitive Health

Adequate vitamin B12 status is important for maintaining cognitive function and protecting against age-related cognitive decline. Low serum B12 levels have been associated with accelerated brain atrophy and increased risk of dementia and Alzheimer's disease. A landmark double-blind randomised controlled trial (the VITACOG study) found that B vitamin supplementation, including vitamin B12, significantly slowed the rate of brain atrophy in individuals with mild cognitive impairment, and was associated with improved cognitive performance, compared with placebo.⁷

HEALTH NEEDS



IMMUNITY



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SCIENTIFIC REFERENCES

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