QUEST

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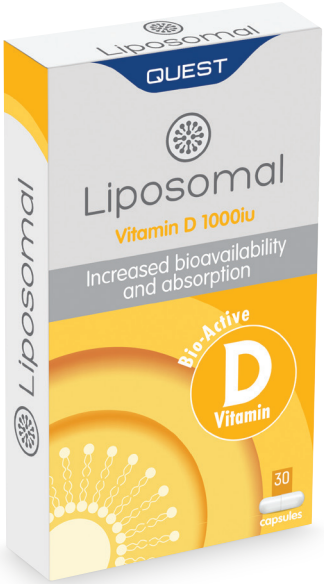
Liposomal

Vitamin D 1000iu

Increased bioavailability and absorption



Nutritional Information

One capsule provides:

			*%NRV
Vitamin D3	1000IU	(25µg)	500

*Nutrient Reference Values

Take one to two capsules daily with food. Swallow with water.

SUMMARY

- Advanced delivery of oral vitamin D3.
- High bioavailability and absorption of vitamin D3.
- Increased cellular delivery of vitamin D3.
- Highly stable vitamin D3 protected from degradation.
- Liposomal vitamin D3 is well tolerated.
- Supported by studies and advanced manufacturing processes.

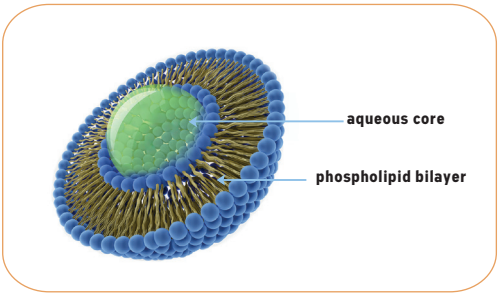
LIPOSOMES & LIPOSOMAL DELIVERY

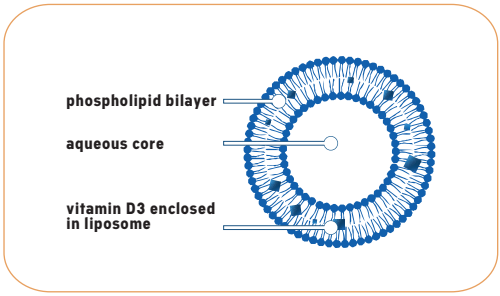
Liposomes are a form of lipid-based delivery that promote intestinal absorption, intracellular uptake and bioavailability of active nutrients, such as vitamin D3. Liposomes are microscopic-sized spherical envelopes or pockets containing an aqueous core. The phospholipids are arranged into a spherical cell membrane like lipid bilayer, knows as a phospholipid bilayer.

Liposomes structures can be used for advanced delivery of vitamin D3, which is then described as liposomal vitamin D3. The liposomal vitamin D3 is created through a careful manufacturing process resulting in an innovative delivery form of the nutrient with significant advantages for the consumer.

In the case of hydrophobic (oil-soluble) nutrients, such as vitamin D3, the active nutrient is enclosed within the phospholipids bilayer membrane of the liposome.

Illustrations of liposomal vitamin D_3 structure





ADVANTAGES OF LIPOSOMAL DELIVERY OF VITAMIN D3

The advantages of liposomal nutrients are derived from the liposome structure itself. vitamin D3 is contained within the phospholipid bilayer and is sealed and encapsulated. Liposomal encapsulation provides a barrier around the active vitamin D3, increasing resistance to digestive enzymes, acidity, intestinal flora, and oxidation.[1] This results in the protection of the vitamin D3 from degradation and oxidation as well as protecting the digestive tract from potential irritation, thereby improving delivery and bioavailability. In addition, interactions between the liposome's phospholipid bilayer membrane and the body's cell membranes offer enhanced cellular uptake through endosomal mechanisms.

As a result, the advantages of liposomal nutrients include:

- High bioavailability and absorption of vitamin D3 compared with conventional oral forms of vitamin D3.
- Protection of vitamin D3 against the acid environment of the stomach, oxidation, and degradation.
- Increased transmucosal (oral) uptake and absorption of vitamin D3.
- Increased intracellular delivery of vitamin D3.
- High stability of vitamin D3.
- Cost effective by being able to take a lower dose of vitamin D3 for the same effect.

LIPOSOMAL MANUFACTURING PROCESS

The Liposomal nutrients used by Quest are supplied by Lipsovit® 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.

STUDY OF LIPOSOMAL DELIVERY OF VITAMIN D3

A study comparing the absorption and serum levels of individuals supplementing with vitamin D3 in liposomal form versus a conventional oil-based form concluded that liposomal vitamin D3 supplementation was twice as fast as conventional vitamin D3 supplementation in delivering vitamin D3 to the body.

The study showed that liposomal supplementation increased the serum levels within hours of supplementation, whereas the conventional supplementation had no effect on serum levels in this time period.

The study concluded that the onset time required to elevate vitamin D3 levels in the body was significantly shorter for liposomal supplementation, concluding that liposomal delivery used faster absorption pathways due to the encapsulation of the vitamin D3 in liposome structures.[2]

OVERCOMING THE CHALLENGES OF ABSORPTION OF VITAMIN D3

Oral bioavailability of compounds depends predominantly on its solubility in water and passive transfer across barriers in the body, such as the epithelial cells in the gut. The highly hydrophobic nature of vitamin D3 causes challenges in effective digestion and absorption of this active and essential nutrient through conventional supplementation.

While the poor absorption challenges of vitamin D3 are well understood and documented, advanced liposomal delivery of vitamin D3 now provides a highly effective solution and significantly enhances the bioavailability and absorption of vitamin D3.

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

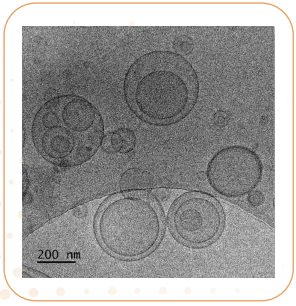

Image of Lipsovit® liposome structures using x1000 magnification under scanning electron microscope.

BENEFITS OF VITAMIN D3 SUPPLEMENTATION

A vitamin D3 supplement can be used to support bone and immune health. Vitamin D3 contributes to the normal function of the immune system and muscles. It is needed for the utilisation of calcium in the body and helps to maintain bones and teeth. Vitamin D3 is naturally created by the body through exposure to sunlight and is recommended as a supplement for individuals with limited exposure to sunlight.

A number of factors can negatively affect the vitamin D status of individuals, requiring Vitamin D3 supplementation. In particular, the following population groups have a higher risk of Vitamin D3 deficiency:

- **Individuals with limited sunlight exposure**.[5] This can be caused by geographical location, winter months, pollution, clothing and indoor lifestyles.
- **Individuals with darker skin tones**. [6]
- **The elderly**.[7] Lower Vitamin D3 levels have been observed in the elderly population.
- **Over weight individuals**.[8] A high BMI and abdominal obesity contribute to Vitamin D3 deficiency, including in children.
- **Pregnant and lactating women**. [9]
- **Children and adolescents**.[10]
- **Patients with serious illnesses**.[11] infection or those who are hospitalised for long periods.
- **Vegans**.[12]
- **Smokers**.[13]

In recent years there has been increasing research showing that the traditional recommendations for vitamin D supplementation are inadequate for maintaining the vitamin D serum levels in high-risk populations, especially pregnant women and individuals with low sun exposure and darker skin tones.[14]

HEALTH NEEDS

BONES | EVERYDAY HEALTH & WELLBEING | IMMUNITY | PREGNANCY & FERTILITY | SENIOR'S HEALTH

SCIENTIFIC REFERENCES

1. Nanoscale Res Lett 8, 102 (2013)
2. Nanomedicine. 2022 Jul:43:102552.
3. Biomaterials. 2005;26: 2713-2722
4. Small. 2010;6:12-21
5. Eur J Clin Nutr. 2009 Dec;63(12):1455-7
6. Curr Med Res Opin. 2006 Feb;22(2):405-15
7. Eur J Clin Nutr. 2010 May;64(5):461-7
8. Br J Nutr 2010;104(3):309-314
9. J Bone Miner Res. 2011 Oct;26(10):2341-57
10. Pediatrics 2009;124(3):e371-e379
11. J Adolesc Health. 2005 Jul;37(1):75
12. J Am Diet Assoc 2000;100(4):434-441
13. J Bone Miner.Res 2000;15(4):780-787
14. J Nutr. 2010 Mar;140(3):542-50

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