

# Liposomal Vitamin C™



Oral Liquid

Immune system support

## OVERVIEW

- > Provides 1 g vitamin C per 5 ml dose
- > Supports immune system health
- > Supports wound healing
- > Maintains collagen health and formation
- > Assists connective tissue formation and supports connective tissue health
- > Antioxidant support
- > Vegetarian, gluten and dairy-free formula

Active Ingredients per 5 ml serve	
Sodium ascorbate Equiv. Ascorbic acid (Vitamin C)	1.15 g  1 g

<b>Pack Size</b>	175 ml
<b>Serving Per Pack</b>	35 serves

Excipients	
Sunflower lecithin Equiv phospholipids 27.3 mg/g Purified water Glycerol Ethanol	Orange Oil Tocofersolan Steviol glycosides

Directions for Use
Adults: Take 5 ml daily. Hold in mouth for 30 seconds before swallowing, take on an empty stomach. Or as directed by your healthcare professional.

Allergen Information
No added: Gluten, dairy, lactose, nuts or soy.

Prescribing Information:
<ul style="list-style-type: none"> <li>• High doses of Vitamin C may lead to loose bowels and diarrhoea.</li> <li>• <b>Aluminium-based antacids:</b> Vitamin C increases the amount of aluminium absorbed, separate doses by at least 2 hours.</li> <li>• <b>Aspirin:</b> May interfere with both absorption and cellular uptake mechanism for vitamin C, therefore increasing vitamin C requirements.</li> <li>• <b>Warfarin:</b> large amounts of vitamin C might decrease the effectiveness of warfarin.</li> </ul>

Warnings:
<ul style="list-style-type: none"> <li>• If symptoms persist, talk to your healthcare professional.</li> <li>• Vitamin supplements should not replace a balanced diet.</li> <li>• Contains 133 mg of sodium per serve.</li> </ul>

Designed and packed in Australia from imported ingredients.



No Added  
Gluten



No Added  
Dairy



No Added  
Lactose



No Added  
Nuts



No Added  
Soy

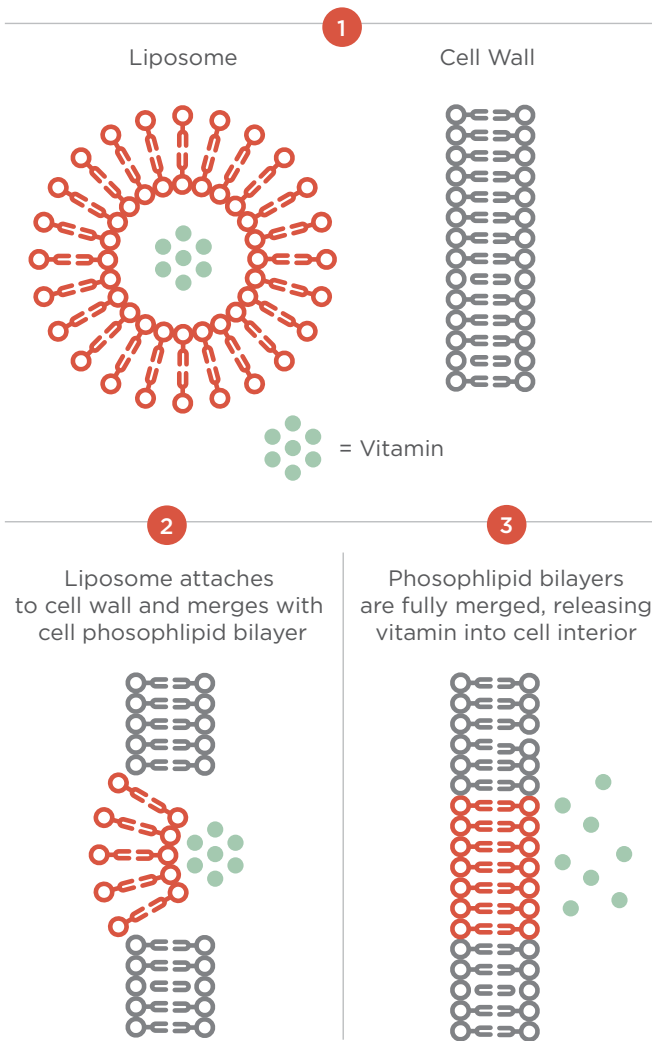


**EDUCATION**

**Liposome structure and function**

A liposome is a vesicle made up of at least one phospholipid bilayer, which can be used to deliver hydro- or lipophilic drugs into the cell. The liposome vesicle's phospholipid bilayer merges with the phospholipid bilayer of the cell wall, releasing the nutrient into the cell interior (see fig.1).

**Figure 1:** Liposomal Vitamin merging onto cell wall.



Liposomes can range in size, with smaller vesicles giving greater absorption and cellular uptake, being cleared at a slower rate giving greater opportunity for absorption, and being able to be absorbed from the buccal cells meaning they get to the cell more quickly than waiting for absorption into the bloodstream from the stomach. The liposomes in Designs for Health products are 50-100nm in size.<sup>1</sup>

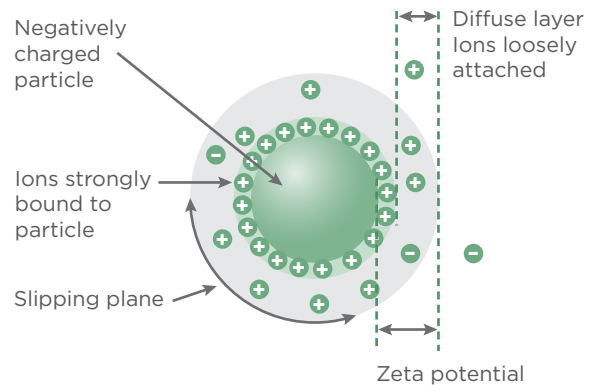
**Liposomal Quality - particle size is not the whole story**

**Zeta potential**

One of the key physicochemical properties that determine liposomal quality is the integrity and structure of each liposomal sphere. If the sphere fails, the medicine within the liposome can leak, rendering the liposome ineffective.<sup>8</sup>

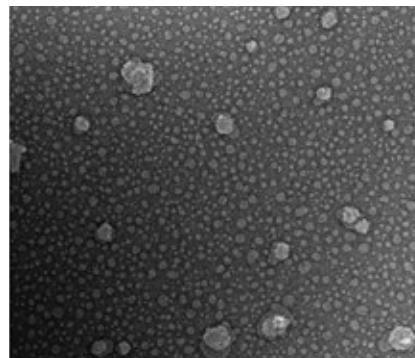
One way to monitor the integrity of the spheres to ensure medicine retention is to measure the net charge or "zeta potential".<sup>8</sup>

Zeta potential is defined as the electrical charge between the outer edge of the sphere (the slipping plane) and the free water molecules/ions surrounding the outer edge of the sphere. If the ions on the edge and the free ions both have a similar electrical charge (for instance, both positive), a repulsive force is created (like that created when two batteries are placed side by side with their positive ends facing one another). This force keeps the sphere formation intact.<sup>9</sup>

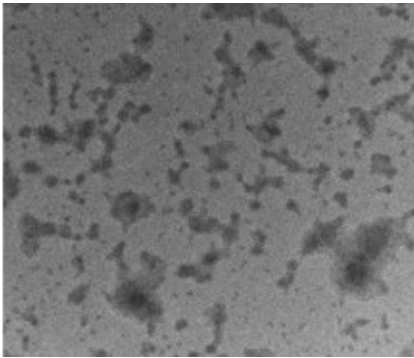


**Zeta potential measurement<sup>9</sup>**

Low Zeta potential is an indication that the integrity of the sphere is compromised and that the liposomal medicine has become an emulsion. The higher the zeta potential, the greater the stability and integrity of the liposome. See Figures 2 and 3.



**Figure 2:** Liposomal Medicine with spheres intact. Zeta potential = negative 34eV (Designs for Health Liposomal D3).



**Figure 3:** Liposomal medicine with spheres compromised. Zeta potential = negative 14 eV.

From the above, it also becomes obvious that the presence of water is critical to creating a stable liposomal formulation.

Each batch of Designs for Health Liposomal products is tested for zeta potential upon release and then throughout the shelf-life of the product to ensure the superior quality of our Liposomals.

#### Benefits of liposomal delivery<sup>2</sup>

- Facilitates absorption in the buccal cells
- Facilitates gastrointestinal uptake
- Prevents breakdown by stomach acid
- Able to incorporate both hydro- and lipophilic agents
- Reduces risk of side effects
- Increased circulation time with smaller nanoparticles (inverse relationship between particle size and clearance time)
- Increased absorption with smaller particle size (9-fold increase from 236nm to 97nm and 34-fold higher at 64nm)
- Increased patient compliance for those who cannot or prefer not to swallow tablets
- Increased ability for flexible dosing

#### Immune system support

Ascorbic acid (vitamin C) is commonly linked to the immune system. *In vitro*, vitamin C has been shown to effect production and function of neutrophils, lymphocytes and phagocytes.<sup>3</sup> Vitamin C is also protective for these leukocytes, neutralising the reactive oxygen species (ROS) released by leukocytes to kill pathogens before they can damage healthy endogenous cells.<sup>3</sup>

Other *In vitro* studies have shown vitamin C to support interferon production – a type of cytokine with an antiviral effect.<sup>3</sup>

For daily immune system support, vitamin C intake should be at a level which maintains or saturates plasma levels – 100-200mg per day minimum – while intake during infection should be considerably higher to meet the increased demand.<sup>4</sup>

#### Collagen health

Vitamin C acts as an important cofactor for the hydroxylation of proline and lysine – a necessary step in collagen formation.<sup>5</sup> *In vitro*, treatment with vitamin C increased collagen secretion in skin fibroblasts and resulted in a more pepsin-resistant collagen.<sup>5</sup>

It is more difficult to measure the effect of vitamin C on collagen formation *in vivo*, though mouse models have demonstrated increased stabilisation of collagen and stimulated mRNA collagen production.<sup>6</sup>

#### Wound healing

In mouse models, the addition of vitamin C to drinking water or delivered via intraperitoneal infusion resulted in higher collagen deposition in wounds, lower levels of pro-inflammatory mediators and increased expression in genes which induce wound healing, resulting in greater healing support at 7- and 14-day measures.<sup>7</sup>

Leukocytes are important for wound healing. One type of leukocyte, neutrophils, are active during the initial inflammatory stage, migrating to the wounded area to release ROS and antimicrobial proteins.<sup>4</sup> These then undergo apoptosis and are cleared, ending the inflammatory phase of healing.<sup>4</sup> Vitamin C influences each of these initial steps.<sup>4</sup>

#### Antioxidant activity

Vitamin C is one of the body's principle non-enzymatic antioxidants, protecting the cells from the ROS created during immune system function, every-day metabolism and toxin exposure.<sup>3</sup>

*References supplied on request.*

### Designs for Health Quality Guarantee

Designs for Health medicines that are listed on the Australian Register of Therapeutic Goods will display an AUSTL number on the label. Listed medicines in Australia need to be manufactured according to legislated standards set out in Therapeutic Goods Order 101. TGO101 legislation sets out minimum quality standards for medicines supplied in Australia that display an AUSTL number. It mandates testing for:

- Impurities such as heavy metals (including lead, mercury, cadmium and arsenic), pesticides and residual solvents
- Dissolution (to ensure the capsule will dissolve once taken)
- Uniformity (to ensure that every capsule is the same)

Final assay testing is also performed to ensure that what we have on the label is in each capsule, and microbiological testing is performed to ensure that no microbial contamination has occurred during the encapsulation and packing process.