

Pharmacokinetic study exploring liposomal D₃ and its uptake within blood plasma over a 24-hour period

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Cholecalciferol, also known as Vitamin D₃ is naturally occurring within the body and additionally found in animal products such as, oily fish and liver. Vitamin D₃ is typically administered to patients with a deficiency or insufficiency¹. 1 in 4 Australians are impacted by vitamin D deficiency reflecting the high prevalence amongst society². By utilising passive loading via sonication with phosphatidylcholine and TPGS, D₃ can be encapsulated within liposomes increasing its absorption and bioavailability. The advanced delivery system improves the natural benefits of the vitamin, enhancing its properties when administered while also protecting it from the harsh conditions in the gut.

Utilising the nano delivery technology, formulated by Pharmako Biotechnologies, a 24-hour pharmacokinetic study was conducted. A total of 10 subjects (4 male and 6 female) received a single dose of 3500 IU of vitamin D₃ as PlexoZome[®] D₃. Samples were taken prior to administration followed by every 15 minutes for the first hour, hourly for the proceeding 8 hours and a final sample at 24 hours. The data was averaged and tabulated below in figure 1. These results were compared against a previous study we have conducted using a single 5000 IU dose of an oral nano-emulsion spray with a single 5000 IU dose of a vitamin D₃ tablet, as per figure 1. Based on the data collected, D₃ blood plasma concentrations were increased by approximately 9% in a single dose. Additionally, the AUC revealed an almost 3 times increase in absorption of the PlexoZome D₃ in comparison to a standard D₃ tablet formulation and 1.4 times increase to the nano emulsion formulate oral spray. Hence, liposomal technology can be used as a successful delivery method of vitamin D₃ and evidently improves the administration over a 24-hour period.

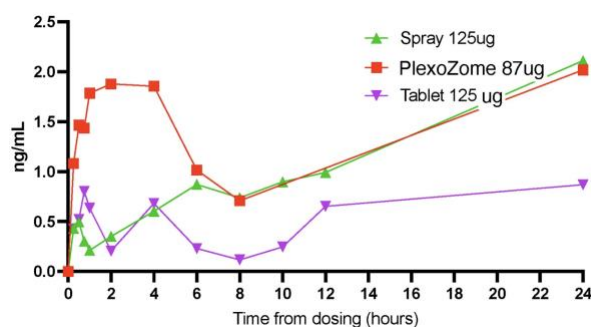


Figure 1: Pharmacokinetics profile of vitamin D₃: temporal change in plasma D₃ concentrations after a single dose of 3500 IU compared to previous study. Concentrations reported as ng/mL

References:

¹ Al-Hashimi N, Abraham S. Cholecalciferol. 2024 Jan 10. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. PMID: 31747175.

²Dunlop E, Boorman JL, Hambridge TL, McNeill J, James AP, Kiely M, Nowson CA, Rangan A, Cunningham J, Adorno P, Atyeo P, Black LJ. Evidence of low vitamin D intakes in the Australian population points to a need for data-driven nutrition policy for improving population vitamin D status. *J Hum Nutr Diet.* 2023 Feb;36(1):203-215. doi: 10.1111/jhn.13002. Epub 2022 Mar 25. PMID: 35253289.