LIPISPERSE®

Advanced dispersion technology.

Pharmako's LipiSperse® is an advanced cold water dispersion technology which allows lipophilic active ingredients with otherwise relatively low bioavailability and poor solubility in water, to be easily disolved in cold water, thereby increasing their bioavailability and uptake in the body.

Advantages of utilising LipiSperse® in your product's formulation:

- higher active loads.
- improved functionality.
- enhanced absorption.

Standard lipophilic absorbtion.

Lipophilic active ingredients provide challenges from a formulation and bioavailability perspective. Often improving bioavailability leads to decreased active load in final formulations.

The LipiSperse® solution.

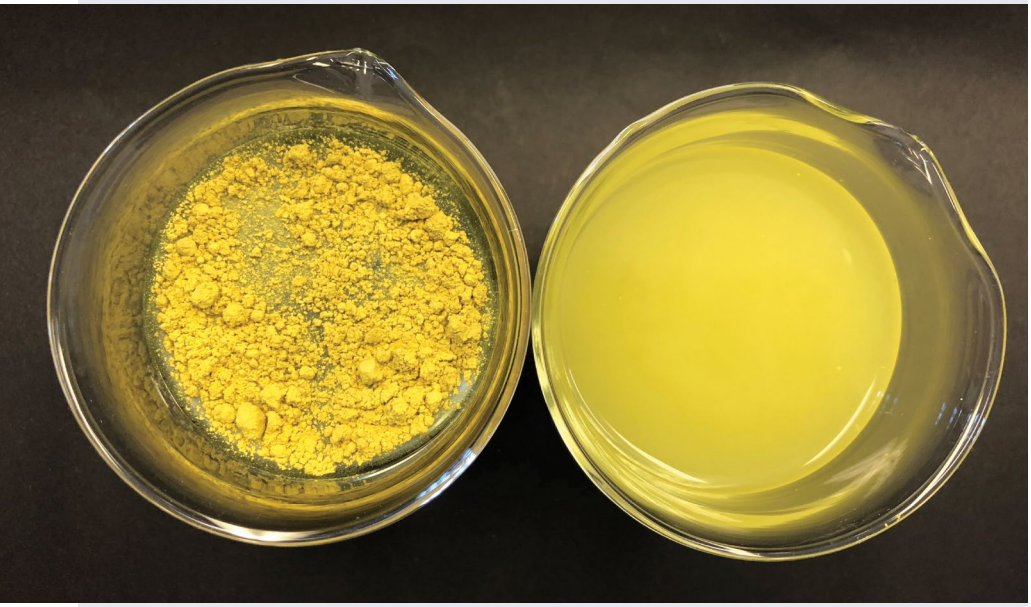
LipiSperse® created cold water dispersible (CWD) powders are specifically designed to increase the bioavailability and functionality of lipophilic actives. In aqueous environments (such as the stomach), the Lipisperse® enhanced active particles freely disperse.

Scientifically validated.

Recent pharmacokinetic studies have shown a significant increase in bioavailability of various lipophilic actives.

Australian made.

LipiSperse® is made in Australia from pharmacopoeial grade ingredients, under cGMP standards.



Typical powder = poor dispersion:
The small effective specific surface area of standard powders or crystals result in reduced bioavailability and functionality. You can see the individual particles and "clumps" or "fish-eyes" stuck together by weak or strong forces. These particles may appear as aggregates (an assemblage of particles rigidly joined together), or as agglomerates (assemblage of particles which are loosely coherent).

LipiSperse® enhanced powder = optimum dispersion:
With LipiSperse® optimised dispersion the effective specific surface area is increased thereby enhancing absorption and functionality.

LipiSperse® formulations can be customised:

- to optimise diverse active ingredient(s) bioavailability.
- for customer requirements.
- for regulatory frameworks.
- for dosage format(s).

LipiSperse®'s enhanced bioavailability is scientifically validated through:

- pharmacokinetic studies.
- clinical trials.

Pharmako can develop LipiSperse® formulations for use in multiple product sectors and applications including:

- nutraceutical,
- cosmetic,
- pharmaceutical,
- veterinary,
- antibacterial,
- dietary supplements,
- food and beverage.

LipiSperse® is approved and customised for active Ingredients such as:

- flavonoids
- botanicals,
- carotenoids,
- polyphenols.

Exclusive use.

LipiSperse® is a patent-pending technology and a registered trade mark owned exclusively by Pharmako Biotechnologies Pty Ltd.

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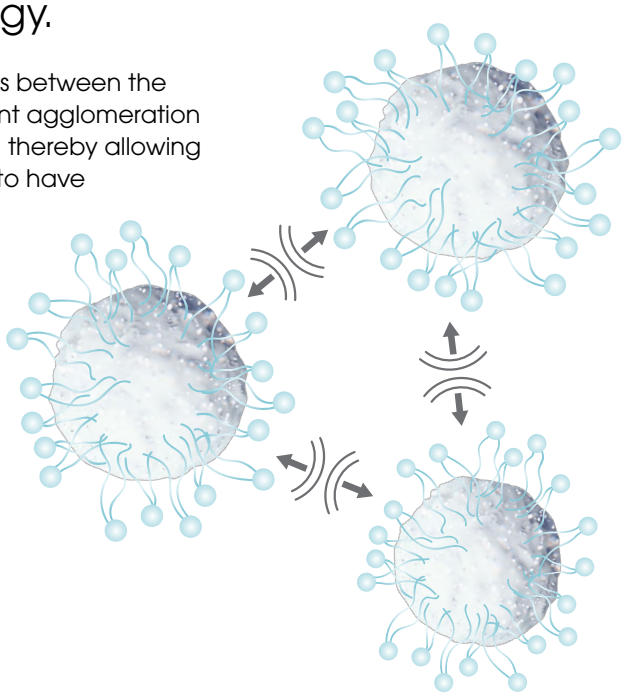
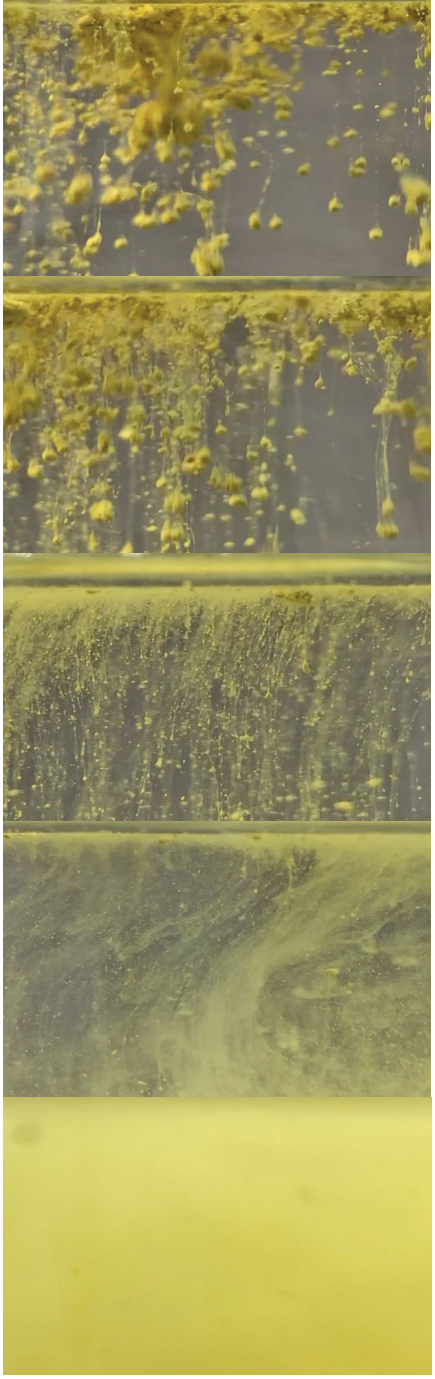
LIPISPERSE®

LipiSperse® technology.

Repulsive forces between the particles prevent agglomeration or aggregation thereby allowing CWD Powders to have proper particle dispersion.





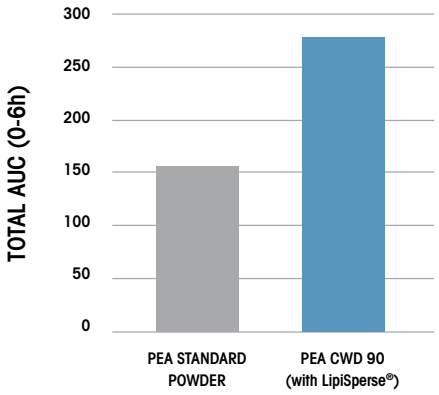
LipiSperse® in action: Timelapse photography over 60 seconds of Quercetin CWD 90 in water.

Scientific studies.

ABSORPTION OF PALMITOYLETHANOLAMIDE (PEA)

A parallel, double-blind, bioavailability study to measure uptake of PEA over a 24-hour period.

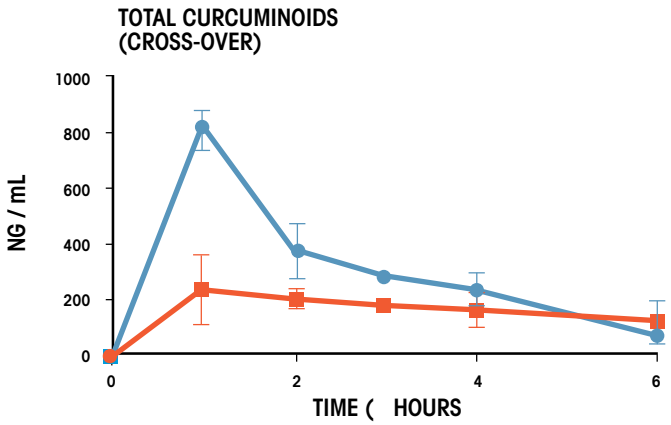
D. Briskey, A. Mallard, A. Rao. The study was conducted with 28 healthy male and female volunteers. Participants were randomised into 2 groups consuming a single 300mg dose of a PEA formulation (with or without LipiSperse®. Blood samples were taken at baseline and 30, 45, 60, 70, 90, 120, 180, 240 minutes post ingestion. The primary outcome measure of the trial was the change in plasma uptake of PEA over a 6 hour period with the resulting area under curve (AUC), concentration max (Cmax) and maximum change from baseline (Delta Cmax) calculated.



Increased bioavailability of curcumin using the Novel Dispersion Technology System (LipiSperse®).

Briskey1,2, A. Sax3, A. Mallard1,2, A. Rao2. Eighteen healthy volunteers participated in this single equivalent dose, randomised, double-blinded study. Seven volunteers further participated in the crossover phase. In both the parallel and crossover trial, Lipisperse curcumin (HydroCurc®) delivered significantly higher plasma curcuminoid concentrations compared to the raw curcumin product (807 vs 318 ng/mL in the crossover trial).

School of Human Movement and Nutrition Sciences, The University of Queensland, 2 RDC Global, Brisbane, Queensland, Australia 3 School of Medicine, The University of Queensland.



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