

## Performance and formulation advantage.

Pharmako's CPO Astaxanthin range is an innovative material development which allows astaxanthin to be utilized in tablet and powder formulations.

CPO Astaxanthin is an alternative to traditional micro-encapsulated oil products. Those have a crust around a liquid astaxanthin centre that commonly, when under pressure, breaks and spills. This can spoil the finished product, and lead to stability challenges.

### Pharmako CPO advantage.

Pharmako's CPO technology absorbs the oil into specially designed silica particles, overcoming such challenges.

### CPO Astaxanthin advantage over standard astaxanthin:

- compressible (for tableting).
- water dispersibility.
- improved functionality.
- enhanced bioavailability.

### CPO formulations can be customised:

- for customer requirements.
- for regulatory frameworks.
- for dosage format(s).

### CPO Astaxanthin can be used in multiple product sectors and applications including:

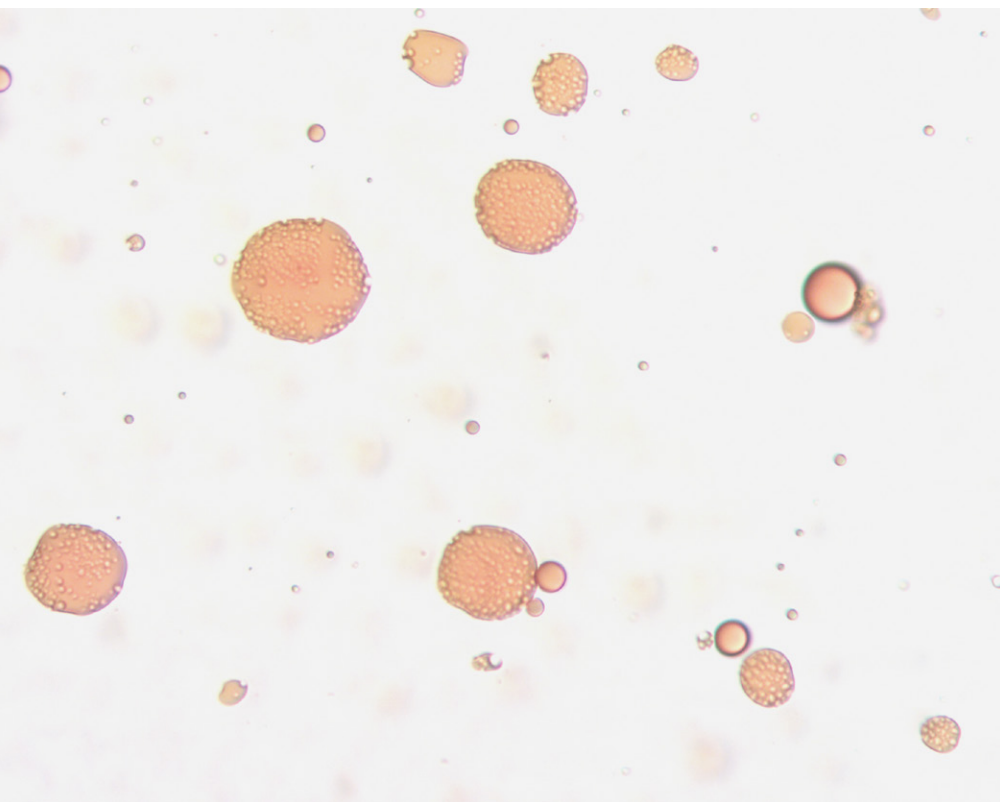
- nutraceutical,
- cosmetic,
- pharmaceutical,
- veterinary,
- food and beverage.

### CPO Astaxanthin.

- Made in Australia.
- Made from pharmacopoeial grade ingredients.
- Has enhanced stability.
- Acceptable odour and taste
- Polycyclic Aryl Hydrocarbons (PAH) free.
- Purity from sourced material is validated through testing for heavy metals, pesticides by Australian Government Dept: National Measurement Institute.

### Pharmako Botanical Source:

*Haematococcus pluvialis* microalgae.



ABOVE: CPO-D Astaxanthin self-emulsifying in water.



## Pharmako CPO Astaxanthin extends the potential uses of this wonderful ingredient.

### Astaxanthin is a powerful antioxidant and anti-inflammatory agent.

Astaxanthin is a red pigment that is a member of the carotenoid family found in certain marine algae. When eaten by shrimp and crustaceans, the pigment lends its reddish hue to their shells. As it becomes more concentrated, astaxanthin creates the beautiful reds and pinks seen in fish such as salmon, or krill.

As research continues to demonstrate the benefits, use of astaxanthin is growing. The global astaxanthin market is predicted to grow 417% to \$500m USD by 2025.

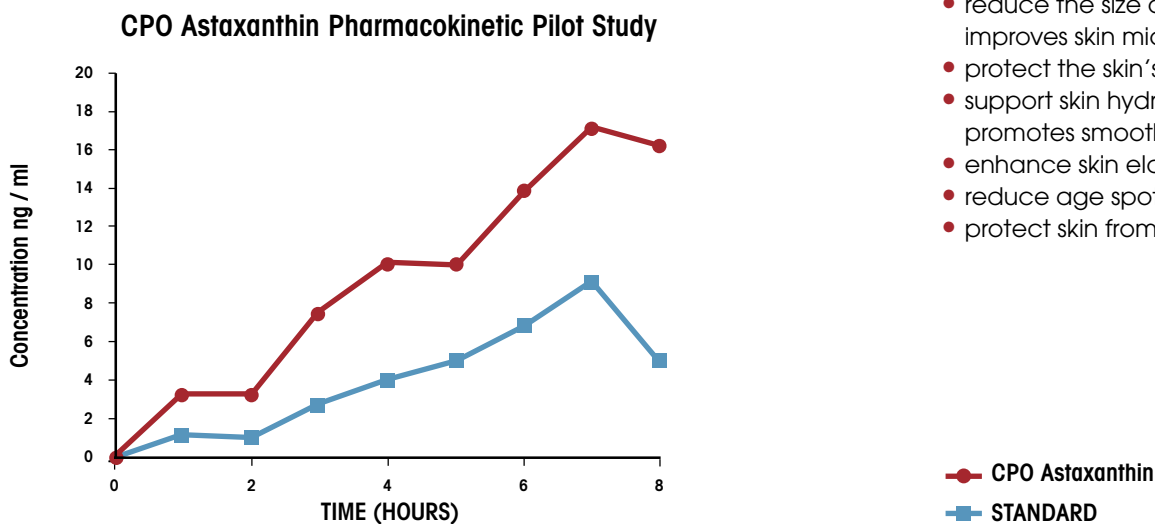
## Scientific studies.

### Pharmako's CPO Astaxanthin with AquaCelle® increases the absorption of astaxanthin.

The aim of this pilot study was to demonstrate that absorption of astaxanthin is increased when combined with AquaCelle® in the Compressible Powdered Oil format.

A single dose, randomised study was used to evaluate the pharmacokinetics of astaxanthin (6 mg) with and without AquaCelle®. Nine healthy male (n=5) and female (n=4) "volunteers" were recruited to take part in this pilot study. Astaxanthin pharmacokinetics were determined from venous blood samples taken prior to dosing (t = 0), followed by intervals of 0.5, 1, 2, 3, 4, 5, 6, 7, and 8 hours post supplementation.

This study showed that a single dose of CPO Astaxanthin with AquaCelle®.



**TABLE 1: ABSORPTION OF ASTAXANTHIN**

|                                       | BASELINE CONCENTRATION (ng/ml) | C <sub>MAX</sub> (ng/ml) | T <sub>MAX</sub> (hours) | TOTAL AUC (0-8 hours) |
|---------------------------------------|--------------------------------|--------------------------|--------------------------|-----------------------|
| GROUP A: STANDARD ASTAXANTHIN         | 6.6 ± 4.8                      | 9.23                     | 7                        | 32.22                 |
| GROUP B: CPO ASTAXANTHIN – AQUACELLE® | 5.0 ± 5.6                      | 17.15                    | 7                        | 72.82                 |

Please note this product description sheet is applicable for customers in countries all over the world and hence it may contain statements or product classification not applicable to your country. The claims made are in reference to ingredients only, and do not refer to finished products. The claims may not comply with different regulations. The marketer of any finished product containing any ingredient is responsible for assuring that the destination of the product and the claims made for the finished product are lawful and comply with all applicable laws and regulations of the country or countries in which the product is to be sold.

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### CPO Astaxanthin's vision benefits:

- helps to focus and re-focus strained eyes.
- reduces oxidative stress in eyes.
- relieves eye fatigue.
- helps alleviate eye strain.
- helps eyes resist and recover from screen time.
- promotes good circulation and nourishment of eyes.
- helps promote visual acuity and enhance depth perception.

### CPO Astaxanthin's sports benefits:

- supports endurance, muscle performance and muscle recovery.
- reduces build-up of lactic acid.
- supports sustained energy and athletic performance.
- helps improve power output.
- protects against exercise-induced muscle damage.
- promotes good circulation and oxygenation of muscles.
- promotes mental clarity and focus.

### CPO Astaxanthin supports skin and assists:

- reduce the size of wrinkles and improves skin micro-texture.
- protect the skin's collagen layer.
- support skin hydration and promotes smooth skin.
- enhance skin elasticity.
- reduce age spots and fine lines.
- protect skin from low humidity.