

White curcumin derived from curcumin, is obtained by the catalytic hydrogenation of the double bonds of the curcumin and followed by the encapsulation with beta-cyclodextrin to get more bio availability. It is a unique blend of white curcuminoids which contain 75-80% of Tetrahydrocurcuminoids (THC), 15-20% of Hexahydrocurcuminoids (HHC) and 3-5% of Octahydrocurcuminoids (OHC). These are the main metabolite of curcumin and the structures as shown below.

White curcumin is phenolic in nature, acting as antioxidants, protecting against free radicals and preventing the generation of free radicals. White curcumin showed greater anti-oxidative activity and free radical scavenging activity than their curcumin parent compounds. Studies indicate that white curcuminoids exerts more protection than curcumin against chloroquine (CQ, a drug to prevent Malaria) induced toxicity by its ability to improve the lipid peroxidation through the free radicals scavenging activity, which further enhanced the levels of antioxidant defence system in the liver and plasma. Moreover, it has been demonstrated to have significant larvicidal activity against some parasitic species in vitro and in vivo and white curcuminoids together with 5-FU exerts a synergistic effect and prove chemotherapeutically useful in treating human colon cancer.

The water solubility and the bio-availability of the white curcumin can be further increased by the encapsulation with beta-Cyclodextrin. Cyclodextrins are a family of cyclic oligosaccharides with a hydrophilic outer surface and a lipophilic central cavity. Cyclodextrin molecules are relatively large with a number of hydrogen donors and acceptors and, thus, in general they do not permeate lipophilic membranes. Cyclodextrins are widely used as 'molecular cages' in the pharmaceutical, food and cosmetic industries. beta-Cyclodextrin is used as complexing agents to increase the aqueous solubility of poorly soluble white curcumin and to increase their bioavailability and stability. The white curcuminoid molecules can be entrapped in cyclodextrin lipophilic cage, hence the white curcumin-cyclodextrin matrix thus have more bio-availability, solubility and stability.

Unlike yellow curcumin, curcumine white e is a colorless compound which can therefore be used in color free cosmetic products which currently employ conventional and synthetic antioxidants. Curcuminoids and therefore curcumine white offer protection to the skin and should be considered for inclusion as functional antioxidants in topical preparations. Curcumin white scavenges free radicals that are generated through exposure to ultraviolet radiation, chemicals or other environmental stress factors which age the skin.

Several independent studies reported the significant antioxidant effects of Tetrahydrocurcuminoids and their utility in achromatic food and cosmetic applications that currently employ conventional synthetic antioxidants. Tetrahydrocurcuminoids was shown to be a more efficient antioxidant than the curcuminoids, curcumin, and vitamin E in laboratory studies. The concentration of Tetrahydrocurcuminoids needed to scavenge free radicals (IC50) was 2.3, 2.7 and 5.8 times lower than that of Curcuminoids, Curcumin and vitamin E, respectively.

Tetrahydrocurcuminoids inhibit cross linking of proteins, supporting healthy aging. Described as a "crossregulin" composition, this natural ingredient is effective in skin lightening, and offers protection against UVB rays, melanoma, and age spots. Tetrahydrocurcuminoids also support skin texture through inhibitory effects on enzymes that help to break down connective tissues. The composition also effects skin lightening effects through tyrosinase inhibition. Tetrahydrocurcuminoids were found to be several fold more effective as a skin lightener than other natural skin lightening agents including glabridin (licorice extract) and kojic acid.

Some of the cosmeceutical applications of Tetrahydrocurcuminoids are as below.

- **Dyschromia management support**
- **Skin tone lightener**
- **Protection against UVB (sun care, after-sun care)**
- **Antiaging Support**
- **Antioxidant.**