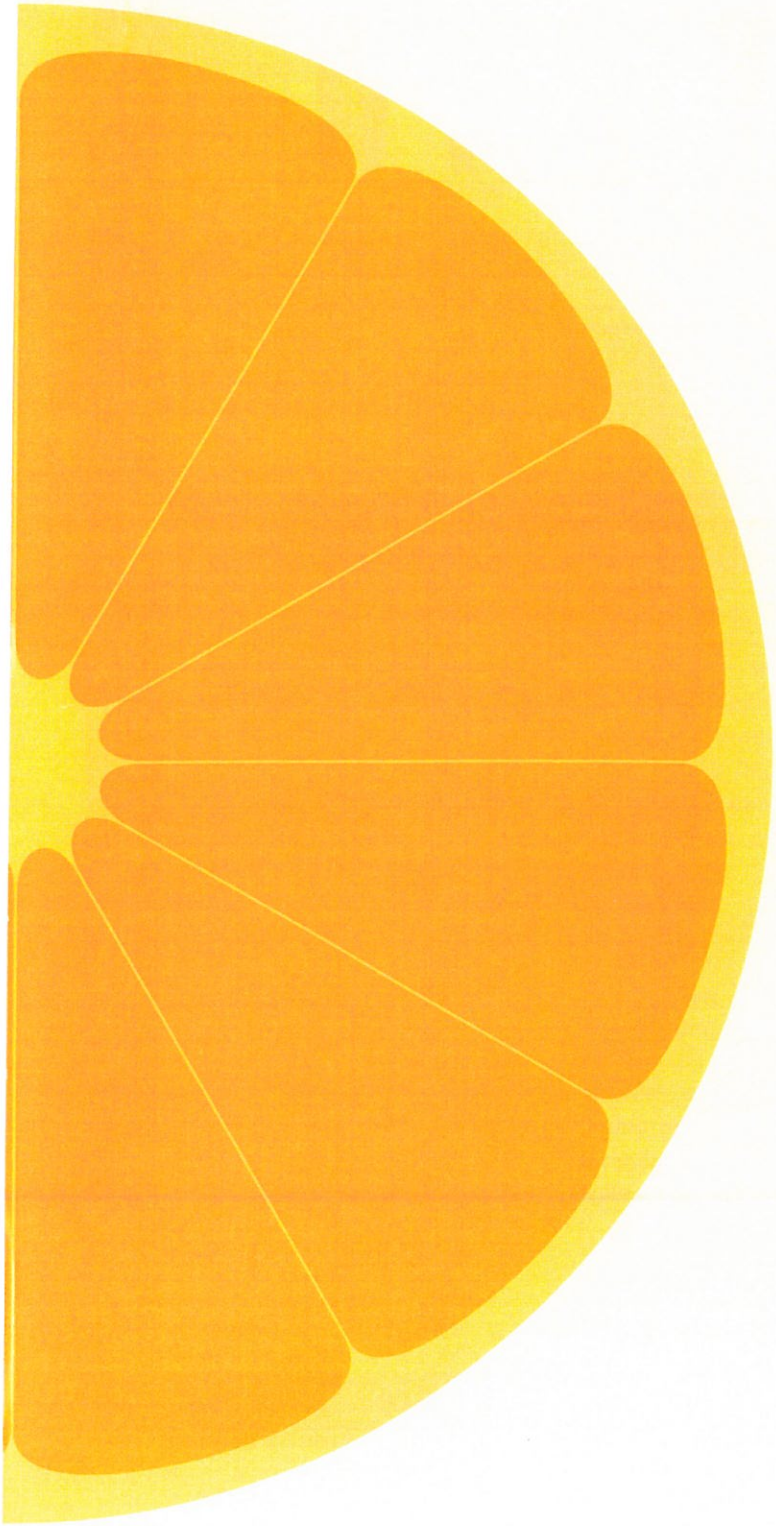
β-CRYPTOXANTHIN

— A NEW FUNCTIONAL FOOD MATERIAL FROM SATSUMA MANDARIN —



WHAT IS 'SATSUMA MANDARIN'?

Satsuma mandarin (*Citrus unshiu* Marc.) is a seedless and easy-peeling citrus. It is the most popular fruits in Japan, not just tasty but also nutritionally rich. Among the nutritions found in Satsuma mandarin, the most characteristic one is β-cryptoxanthin (β-CRX).

WHAT IS 'β-CRYPTOXANTHIN'?

β-Cryptoxanthin (β-CRX) is a kind of pigment called carotenoid, same group as β-carotene or lycopene.

Unlike other carotenoids, β-CRX is not commonly found in fruits or vegetables. It is found only in certain food such as hot pepper, persimmon, papaya or Satsuma mandarin and only little in other popular citrus like orange or grapefruit. As Cohort studies indicate several health promoting benefits of β-CRX, industrial supply is not sufficient at this moment.

UNITIKA'S β-CRYPTOXANTHIN

UNITIKA's advanced technology enabled powder type (ENZYME PROCESSED SATSUMA MANDARIN) of β-CRX for commercial use. Powder type is made from Satsuma mandarin pulp after juicing and 100% edible materials. They are suitable for functional food material.

UNITIKA's β-CRYPTOXANTHINs are ···

- **Safety food materials authorized by official inspection agency.**
- **Good source of β-CRX with excellent bioavailability compared to fresh Satsuma mandarin more than 30 times.**
- **Evidence-based functional food material.**

PRODUCT STANDARDs

Powder Type

Characteristics	Standard Values
Appearance	Orange powder with unique aroma
β-CRX (as free form)	min. 0.2%
Hesperidin	min. 10%
Loss on drying	max. 7.0%
Heavy metals (as Pb)	max. 20ppm
Arsenic (as As_2O_3)	max. 2ppm
Standard plate counts	max. 3,000 cfu/g
Moulds and yeasts	max. 1,000 cfu/g
Coliforms	negative

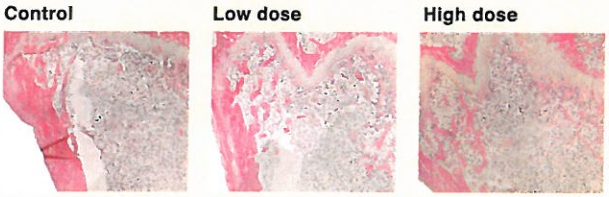
ANTI-OSTEOPOROSIS

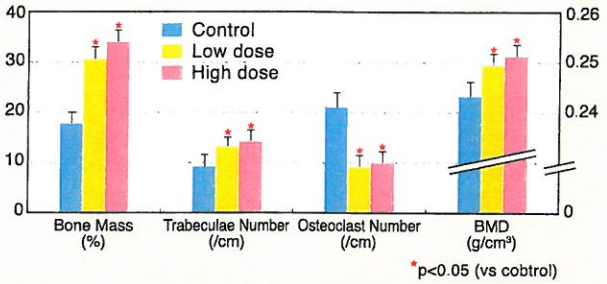
Animal Trial

Ovariectomized SD rats were housed for 5 weeks feeding either normal, low dose (30mg /day) or high dose (300mg/day) of powder-type β-CRX supplemented diet. Osteoclasts reduction and BMD elevation were observed on both low dose and high dose groups. Bone mass was also increased and trabeculae structures were improved (upper and middle panels).

Human Trial

Placebo controlled double blind trial was carried out. Subjects were post-menopausal females and were administrated powder type β-CRX either null (control), Low dose (100mg/day) or High dose (400mg/day) for 12 weeks. Serum bone alkali phosphatase (BMP), a famous osteogenic marker, increased significantly in both Low dose and High dose group compare to the initial value (lower panel; * p<0.05 vs before the trial).

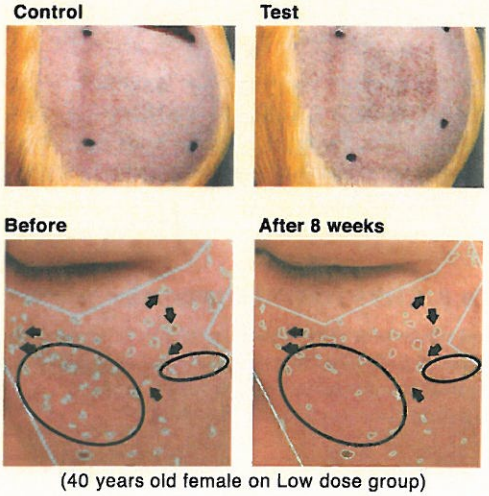




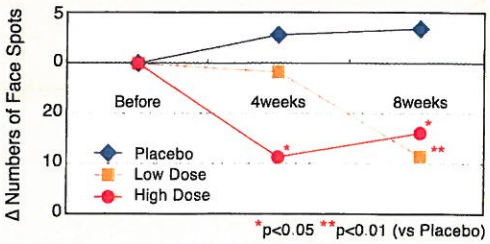
Human Serum BAP

	Before	4weeks	12weeks
Control	26.6 ± 5.16	27.3 ± 4.72	28.9 ± 4.81
Low dose	57.3 ± 6.68	28.1 ± 6.86	29.9 ± 6.13 *
High dose	28.5 ± 7.33	29.0 ± 7.57	32.0 ± 8.21 *

SKIN COMPLEXION IMPROVEMENT



(40 years old female on Low dose group)



Animal Trial

Powder type β-CRX were orally administrated to brown guinea pigs during the test period. UV-B irradiation (0.384J/cm²) were carried out on 8th, 10th and 12th day to the shaved back of the guinea pigs. Pigmentation prevention were visually distinguishable on 23rd day after administration (upper panel).

Human Trial

Placebo controlled double blind trial was carried out. Subjects were healthy adult volunteers and were administrated powder type β-CRX either null (control), Low dose (100mg/day) or High dose (200mg/day) for 8 weeks. Skin complexion was analyzed every 4 weeks using visual analyzer (VISIA™ Evolution). Significant face spots reduction were observed both on Low dose and High dose group (middle and lower panels).

UNITIKA LTD.

Health & Amenity Business Dept.

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