Showa Denko America Inc
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Ascorbyl Phosphate Magnesium & Ascorbyl Phosphate Sodium

What's Ascorbyl Phosphate?

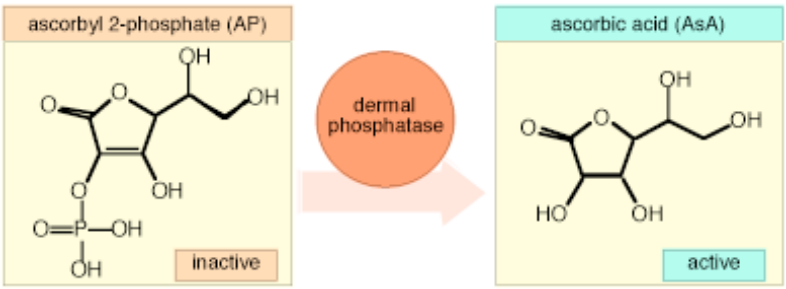
Ascorbyl Phosphate Magnesium (magnesium L-ascorbyl 2-phosphate, APM) and Ascorbyl Phosphate Sodium (sodium L-ascorbyl 2-phosphate, APS) are stable vitamin C ascorbic acid, AsA) derivatives. APM and APS are;

> stable under atmospheric condition

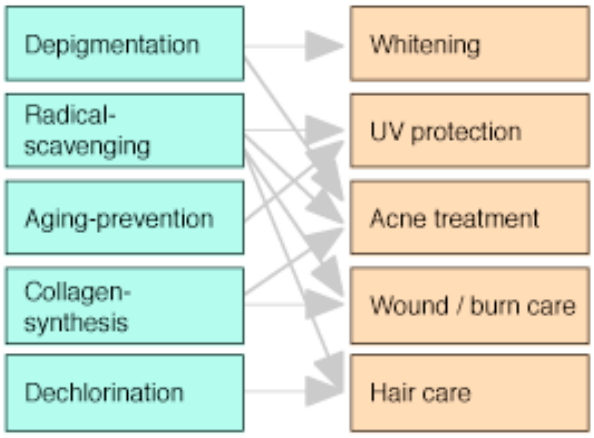
> safe and effective quenchers of intradermal reactive oxygen species

> physiologically more effective than native vitamin C

> capable of improving various skin problems



Various Functions



APM and APS have been mainly utilized as an active ingredient of whitening cosmetics. Recent investigations show us various possibilities to utilize them as multi functioning, stable 'provitamin C'. Intradermal and extradermal protective effects against UV-generated radicals suggest they can be used in UV-care products. As clinical studies strongly support, acne, being re-identified as a radical disease, is another candidate that we should utilize AP for. Enhancing collagen synthesis aids the in the recovery from wounds and burns, in which the reduction of active oxygen species also has an important role.

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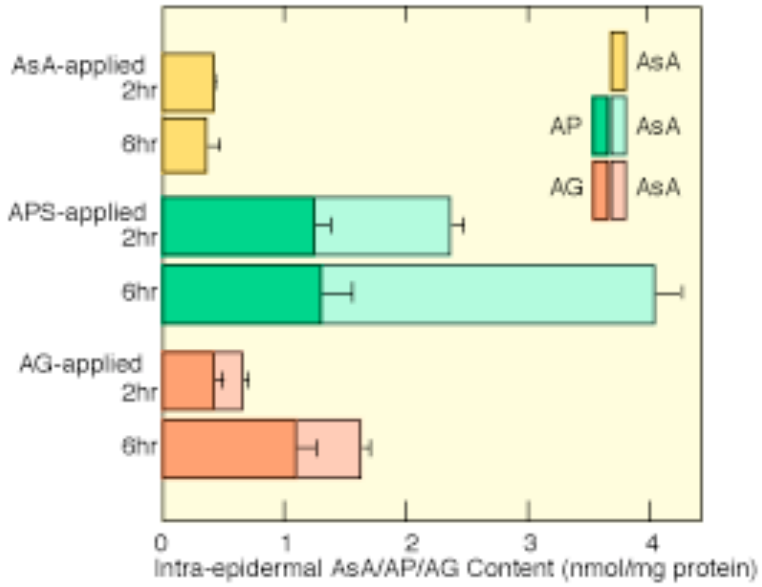
Ascorbate Enriching



AP enriches intradermal ascorbate more effectively than ascorbate itself or other ascorbate derivatives. Based on the observation that activities of hydrolyzing enzymes drastically vary in animals, experiments with human skin samples were necessary to verify the enriching capability. Tiny skin biopsy samples from volunteers were divided into three equal parts and used for the comparison of ascorbate, APS and ascorbyl 2-glucoside AG. Hydrophilic ointment containing 20 mg/g of each substance was placed onto the epidermis side of the skin sample. After incubating for two to six hours, the ascorbate and AP/AG content was determined. The ascorbate enrichment by APS was outstanding: At 6 hours, the 'free' ascorbate content in the APS-fed skin was eight times higher than that of the ascorbate-fed sample, and five times higher than that of the AG-fed sample.

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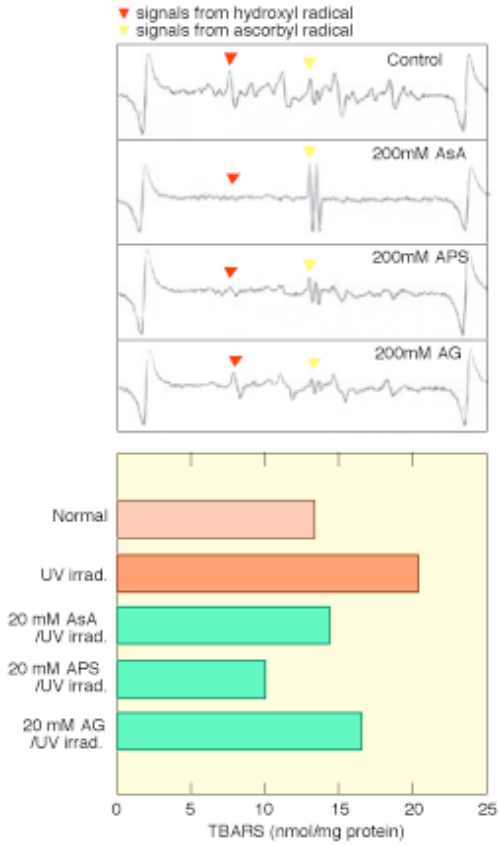
Skin Protection against UV



A new ESR method was developed to directly detect the hydroxyl radical (red triangles) generation in skin. Even though the ESR signals were rather weak and complicated compared with those in homogeneous solutions, we identified easily distinguishable hydroxyl radical-derived peaks. This method seems like a very good way to observe the ongoing events in native skin. Hairless mouse skin was pretreated with 200 mM AsA, APS, or AG for two hours, and ESR spin-trap measurements were carried out under UVB irradiation. As seen in the spectrum, ascorbate quenched hydroxyl radicals almost completely; however, the amount of ascorbyl radicals (yellow triangles) was significant, which may harm the skin. APS reduced the radical amount effectively. AG was less effective. APS prevents lipid peroxidation from UV irradiation. A hairless mouse skin sample was irradiated with UVB at levels of 20 KJ/m2 after a two-hour treatment with 20 mM AsA, APS, or AG in the medium. After a post-incubation period of twenty two "22" hours, the medium didn't contain AsA or derivatives. The amount of intradermal peroxidized lipids were determined by the thiobarbituric acid method. The UVB irradiation increased the amount of TBARS by 1.8 fold. Pretreated with 20 mM AsA, TBARS remained within the same level as the non-irradiated control. The inhibitory effect of APS was even higher; the TBARS amount was less than that of the control sample.

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