

〈一般論文〉

カチオン性化合物との複合化による「2-(Dimethyldocosylammonio)ethyl Octadecyl Ethyl Phosphate」の毛髪吸着性能とケア効果の向上

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Development of Hair Adsorption and Care Effects by Hybridization of a Cationic Compound and [2-(Dimethyldocosylammonio)ethyl Octadecyl Ethyl Phosphate]

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Abstract

2-(Dimethyldocosylammonio)ethyl octadecyl ethyl phosphate (DOEP) is a gemini compound bearing a phosphoryl choline-like moiety. It is well known that gemini compounds exhibit excellent surface activity and a high tendency to self-assemble. Furthermore, the phosphoryl choline moiety is highly biocompatible. Therefore, we expect DOEP to combine the advantages of the phosphoryl choline group and that of gemini compounds. In a previous study, we showed that the compound self-assembled to form nanosized vesicles in water. The compound was also shown to be beneficial for both skin and hair. In this study, we have tried to improve the absorption of DOEP by hair in order to enhance its beneficial effects. A formulation of DOEP and a cationic compound (DOEP-BTC) was prepared in order to obtain positively charged DOEP. We expect the positively charged DOEP to be electrostatically attracted to the negative charges in hair. We compared the efficacy of absorption, physicochemical properties, and beneficial effects of a DOEP dispersion (DOEP-Dis) and DOEP-BTC. The surface charge and particle size of the dispersions were measured to determine the effect of the addition of the cationic compound. The surface charge of DOEP-Dis and DOEP-BTC were determined to be +3.2 mV and +42.3 mV, respectively. The particle size of DOEP-Dis and DOEP-BTC were estimated to be 292 ± 192 nm and 110 ± 62 nm respectively. These facts indicated that the addition of the cationic compound increased the surface charge of DOEP (almost neutral to positive). In addition, it resulted in a smaller particle size of the dispersion. As a result, the absorption efficacy of DOEP-BTC was about five times greater than the absorption efficacy of DOEP-Dis. The beneficial effects were evaluated in terms of the smoothness, elasticity, and moisture content of hair. Compared to DOEP-Dis, DOEP-BTC showed improved beneficial effects on all counts. We presumed that the difference in the beneficial effects was due to a difference in the amounts of DOEP absorbed by the hair. These results showed that the combination of DOEP and the cationic compound was absorbed better by the hair and resulted in enhanced beneficial effects.

Key words: gemini compound, cationic compound, surface charge, hair absorption, hair care.