日本香粧品学会誌　Vol. 36, No. 1, pp. 1–6（2012）

〈Regular Article〉

# Bactericidal Activity of Quaternium-15 and Its Decomposition Products against Aerobic Bacteria

Keiji KAJIMURA*, Takahiro DOI, Akiko ASADA, Akihiro TAKEDA, Takaomi TAGAMI

(Accepted: December 5, 2011)

**Abstract**

Quaternium-15 (QN) is a formaldehyde (FA)-releasing substance used in cosmetics as an antimicrobial preservative. The purpose of this study was to examine the bactericidal properties of cosmetics containing QN. The amount of FA was measured in five types of commercial cosmetics containing QN. FA was detected in all the samples analyzed, and free FA concentrations ranged from 106.4 ppm to 493.5 ppm. However, QN was undetectable in the cosmetics samples (＜0.001 w/w%). Preservative effectiveness testing was performed on these cosmetics using three strains of aerobic bacteria as test microorganisms (*Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Bacillus subtilis*). Bactericidal activity against the three bacteria was determined for all cosmetics samples. The release of FA due to QN decomposition was investigated. An aqueous QN solution (0.3 w/v%) was stored at a constant temperature of 25°C; the concentration of FA reached approximately 350 ppm after 50 days. QN concentration decreased over time and reached an undetectable level after 50 days. QN decomposition products other than FA were confirmed in this solution using high-performance liquid chromatography (HPLC) analysis. Bactericidal activity against *S. aureus*, *P. aeruginosa*, and *B. subtilis* was determined for QN. Further, similar bactericidal activity was found for QN decomposition products other than FA. Thus, QN and its decomposition products, including FA, play a major role in the preservative effect of cosmetics containing QN, and this effect was maintained at a virtually constant level for a long period.

**Key words:** quaternium-15, decomposition product, formaldehyde, bactericidal activity, aerobic bacteria.