

## “Facial Amphiphilic Antimicrobial Polymers based on Bile Acid Multicyclic Terpenoids”

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**Abstract:** Bacterial infections and antibiotic resistance, particularly by Gram-negative pathogens, have become a global healthcare crisis that needs to be addressed. Cationic peptides and cationic polymers are widely developed as antibacterial agents. However, many of them suffer higher cytotoxicity against mammalian cells and are ineffective particularly against the multidrug-resistant Gram-negative bacteria. New antimicrobial agents with enhanced activity and lower cytotoxicity are urgently needed to prevent the inception of a post-antibiotic era. We have developed multiple cationic charge-containing facial amphiphilic polymers based on derivatives (cholic, deoxycholic and lithocholic acid) of a multicyclic terpenoid, a bile acid. These derivatives bear one, two and three quaternary ammoniums as head groups. Our results indicated that cholic acid polymers containing three cationic head groups showed significantly better antimicrobial activity against several bacterial species, especially, Gram-negative bacteria than deoxycholic acid with two cationic head groups and lithocholic acid with a single cationic head group. The cytotoxicity study on mammalian cells exhibited a similar trend. This is due to the presence of facially oriented hydrophilic cationic head groups and hydrophobicity of the multicyclic fused rings, which could provide better interactions with bacterial cells.