MMSL
Military Medical
Science Letters
Since 1925

Mil. Med. Sci. Lett. (Voj. Zdrav. Listy) 2022, 91 (supplementum 1)
ISSN 0372-7025 (Print)
ISSN 2571-113X (Online)

MEETING ABSTRACTS

NOVEL GEMINI-TYPE OF QUATERNARY AMMONIUM COMPOUNDS WITH STRONG ANTIMICROBIAL EFFECT

Natalie Zivna [1,2], Michaela Hympanova [1,3], Hana Strakova [1,3], Lenka Pulkrabkova [1,2], Jan Marek [1,3]
Presenting author: Natalie Zivna (natalie.zivna@unob.cz)

[1] Biomedical Research Center, University Hospital Hradec Kralove, Sokolska 581, 500 05 Hradec Kralove, The Czech Republic
[2] Department of Toxicology and Military Pharmacy, University of Defence, Trebesska 1575, 500 02 Hradec Kralove, The Czech Republic
[3] Department of Epidemiology, University of Defence, Trebesska 1575, 500 02 Hradec Kralove, The Czech Republic

Since the discovery of penicillin, antibiotic use and misuse lead to the development of bacterial strains resistant to not only antibiotics, but to common disinfecting agents as well. Monomeric quaternary ammonium compounds (QACs) – common disinfecting agents – are already rendered inefficient due to the acquired resistance. The development of novel agents is now a major component in the fight against the spread of diseases. New designs should enhance the advantages of existing substances (high efficacy, low price), while embracing biodegradability, improved solubility and lower cytotoxicity.

In recent years new, yet related class of disinfectants is on the rice. Diammonium quaternary salts – or so-called 'Gemini' QACs, which contain in contrast to their monomeric cousin two polar heads. In total, the molecule contains two positively charged nitrogen atoms and two alkyl chains. From this group; octenidine emerged. Despite its promising results against a broad range of resistant microorganisms, it has many shortcomings: low solubility and mild cytotoxicity. These properties need to be overcome.

In this report, we prepared novel series of octenidine derivates, which have been tested against common nosocomial bacterial strains and against biofilms, which possess unique properties in comparison to single cells. The antimicrobial activity has been evaluated against Gram-positive and Gram-negative bacterial strains. Furthermore, the substances have been tested for cytotoxicity on a mammalian cell line to evaluate one of the key safety parameters.

Keywords: disinfection; quaternary ammonium salts; octenidine; synthesis

References

1. Obłąk E, Gamian A, Adamski R, Ułaszewski S. The Physiological and Morphological Phenotype of a Yeast Mutant Resistant to the Quaternary Ammonium Salt N-(dodecyloxycarboxymethyl)-N,N,N-trimethyl Ammonium Chloride. Cellular and Molecular Biology Letters. 1. červen 2010;15(2):215–33.
2. Calow T, Oberle K, Bruckner-Tuderman L, Jakob T, Schumann H. Contact Dermatitis Due to Use of Octenisept in Wound Care. J Dtsch Dermatol Ges. září 2009;7(9):759–65.