Abstract

In the dissertation thesis we dealt with the antimicrobial susceptibility testing (against gram-positive and gram-negative bacteria, yeasts and filamentous fungi) of newly synthesized compounds and their structure-antimicrobial activity relationship monitoring. These compounds based on quaternary ammonium salts with various structural modifications were prepared in cooperation with the Department of Toxicology and Military Pharmacy of the Faculty of Military Health Sciences of the University of Defence and Biomedical Research Centre at the University Hospital Hradec Králové on a joint project of the Czech Health Research Council.

Selection of a methodology for antimicrobial susceptibility testing was the first part of the thesis. The microdilution broth method, which was successfully implemented at the department, was chosen for this purpose.

The *in vitro* testing of selected synthesized compounds against several bacterial and fungal strains was the next phase of the work. Several substances have also been evaluated for the green microalgae growth inhibition (in terms of environmental friendliness). In addition, cytotoxic effects were tested on mammalian cell line to assess whether the compounds were more suitable as antiseptics or surface disinfectants. Several substances active against individual microorganisms have been identified.

Based on the results of the above-mentioned primary tests, the most effective compounds were selected and consequently combined within four water-soluble mixtures with strong disinfectant and broad-spectrum activity against various microorganisms. Subsequently, a skin irritation test and quantitative suspension tests over a given exposure time were performed. Mixture 4, containing 12-C_{12} and 18-C_{14}, showed the same or in several cases better effects than the commercial detergent Ajatin. This mixture was more effective against varicella-zoster virus in comparison with Ajatin and less irritant to the human epidermis. Based on these results, it was assessed that the mixture 4 could be commercially used as a highly effective disinfectant in the future.

Keywords

antimicrobial compounds, minimum inhibitory concentration (MIC), minimum bactericidal/fungicidal concentration (MBC/MFC), disinfection