

David Suzuki Foundation

The dirt on toxic chemicals in household cleaning products Quaternary Ammonium Compounds (Quats) Irritants and sensitizers that can induce an allergic response following contact with the skin. Quats are also known to cause occupational asthma in cleaning workers and preliminary evidence indicates they may cause adverse genetic and reproductive effects. Chemicals in this class are persistent in the environment and toxic to aquatic organisms. Like triclosan, quats are anti-microbial agents and there is concern that their widespread use in household disinfectants and cosmetics is contributing to antibiotic resistant bacteria, thus limiting treatment options for microbial infections. The Canadian Medical Association has called for a ban on antibacterial consumer products.

Reproductive Toxicology Volume 50, December 2014, Pages 163–170
Volume 50, December 2014, Pages 163–170

Exposure to common quaternary ammonium disinfectants decreases fertility in mice

Abstract

Quaternary ammonium compounds (QACs) are antimicrobial disinfectants commonly used in commercial and household settings Extensive use of QACs results in ubiquitous human exposure, yet reproductive toxicity has not been evaluated. Decreased reproductive performance in laboratory mice coincided with the introduction of a disinfectant containing both alkyl dimethyl benzyl ammonium chloride (ADBAC) and didecyl dimethyl ammonium chloride (DDAC). QACs were detected in caging material over a period of several months following cessation of disinfectant use. Breeding pairs exposed for six months to a QAC disinfectant exhibited decreases in fertility and fecundity: increased time to first litter, longer pregnancy intervals, fewer pups per litter and fewer pregnancies. Significant morbidity in near term dams was also observed. In summary, exposure to a common QAC disinfectant mixture significantly impaired reproductive health in mice. This study illustrates the importance of assessing mixture toxicity of commonly used products whose components have only been evaluated individually.

Quat Binding

<http://www.lhhcp.com/toi.quatbinding.html>

Quat Binding: Why Cotton or Microfiber Cloths Should Not Be Used With Quat Disinfectants

Studies have demonstrated that there may be a reduction of efficacy when quaternary-based disinfectants bind with cleaning materials such as microfiber or cotton. Quats, or quaternary ammonium chloride based disinfectants, are popular because they offer a broad spectrum of pathogen kill, good surface compatibility, and are often the most economical option.

Quats are cationic or positively charged compounds. Because of this, quats have a tendency to become attracted to cleaning tools or fabrics that have an anionic or negative charge. One of the most common cleaning tool fabrics is cotton, which is a natural fiber that consists of 90% cellulose, and has a negative charge. Another common fabric used in cleaning tools is microfiber. Most microfiber cloths are made of a synthetic blend of polyester and nylon (polyamide) which also has a negative charge. When quat disinfectants are used with cotton or microfiber fabric, the positive charge on the quat aligns itself with the negative charge on the fabric and essentially neutralizes the activity of the quat. This may mean that the expected level of disinfectant is not being applied to a surface as it is wiped. The tendency of quats to bind with some fabrics is often referred to as "quat binding" or absorption. It has been shown that quat binding begins as soon as the cleaning tool is dipped into the quat solution, and quat binding occurs both when using the Dip Method and the Soak Method, because much of the absorption may occur in less than 5 minutes. Oxidizing agents, such as Accelerated Hydrogen Peroxide or Chlorine based disinfectants do not bind with cleaning tools, and can be implemented into cleaning programs to ensure efficacy of disinfectants.

Effects of skin absorption?

US Food and Drug Administration request additional information to address data gaps for consumer hand sanitizers. The agency is requesting manufacturers provide data for three active ingredients. Ethanol or ethyl alcohol, isopropyl alcohol and the quaternary benzalkonium chloride. The proposed rule does not require any consumer hand sanitizer's products be removed from the market at this time. Instead, it requires manufactures who want to continue marketing these products under the OTC Drug Review to provide the FDA with additional data on the active ingredients safety and effectiveness, including data to evaluate absorption.

Residues promote biofilm growth.

Published online 2015 February 20. Research Article

Effects of Benzalkonium Chloride on Planktonic Growth and Biofilm Formation by Animal Bacterial Pathogens.

Azizollah Ebrahimi 1; Majid Hemati 2,*; Ziba Shabanpour 2; Saeed Habibian Dehkordi 1; Shahab Bahadoran 1; Sharareh Lotfalian 1; Shahin Khubani 2

1 Department of Pathobiology, School of Veterinary Sciences, Shahrekord University, Shahrekord, IR Iran 2 School of Veterinary Sciences, Shahrekord University, Shahrekord, IR Iran *Corresponding author: Majid Hemati, School of Veterinary Sciences, Shahrekord University, Postal Code: 88186/34141, Shahrekord, IR Iran. Tel: +98-9352611155, Fax: +98- 2634340470, E-mail: M_Hemati1@yahoo.com

Background: Resistance toward quaternary ammonium compounds (QACs) is widespread among a diverse range of microorganisms and is facilitated by several mechanisms such as biofilm formation.

Objectives: In this study, the effects of benzalkonium chloride on planktonic growth and biofilm formation by some field isolates of animal bacterial pathogens were investigated.

Materials and Methods: Forty clinical isolates of Escherichia coli, Salmonella serotypes, Staphylococcus aureus and Streptococcus agalactiae (10 isolates of each) were examined for effects of benzalkonium chloride on biofilm formation and planktonic growth using microtiter plates. For all the examined strains in the presence of benzalkonium chloride, biofilm development and planktonic growth were affected at the same concentrations of disinfectant.

Results: The means of strains growth increase after the minimal inhibitory concentration (MIC) were significant in all the bacteria (except for E. coli in 1/32 and S. agalactiae in of 1/8 MIC). Biofilm formation increased with decrease of antiseptics concentration; a significant increase was found in all the samples. The most turbidity related to S. aureus and the least to Salmonella.

Conclusions: Bacterial resistance against quaternary ammonium compounds is increasing which can increase bacterial biofilm formation.