

CYTOTOXICITY STUDY OF FABRICS AND NONWOVENS IMPREGNATED WITH IMIDAZOLIUM SALT IN HaCaT CELLS

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INTRODUCTION: The increasing resistance to conventional antimicrobials has significantly aggravated cases of systemic infections, contributing to high mortality rates. Furthermore, the persistence of microorganisms on inanimate surfaces plays a critical role in the spread of infections within hospital environments. In this context, the impregnation of imidazolium salts (IS), which possess well-documented antimicrobial activity, into textile and nonwoven substrates presents a promising strategy for the development of Personal Protective Equipment (PPE). The physicochemical properties and stability of imidazolium salts, combined with their antimicrobial efficacy, support their potential use in enhancing protection in high-risk settings by addressing the growing threat of antimicrobial-resistant infections. However, assessing the toxicity resulting from IS impregnation is essential to ensure safety in practical applications. **OBJECTIVE:** The aim of this study was to evaluate the dermal cytotoxicity of fabrics (Twill) and nonwoven materials (TNT-PE [polyethylene] and TNT-PP [polypropylene]) impregnated with C16MImCl using the HaCat human keratinocyte cell line. **MATERIALS AND METHODS:** Experiments were conducted using an indirect contact method: 1 cm² samples were immersed in 4 mL of culture medium for 4, 8, and 24 hours at 10 °C to generate extraction media (EM). Confluent HaCat monolayers were exposed to EMs at concentrations ranging from 25% to 100% for 24 hours. Cell viability was assessed via Neutral Red uptake and MTT assays (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide), with untreated cells serving as the negative control. **RESULTS:** No cytotoxicity was observed in EMs from impregnated Twill or TNT-PE fabrics, nor from the non-impregnated samples. However, EM from impregnated TNT-PP caused significant cytotoxicity at all concentrations, resulting in 75% and 90% cell death at 75% and 100% EM, respectively. Non-impregnated TNT-PP was non-toxic. This cytotoxic profile was consistent across all incubation periods (4, 8, and 24 h). Additionally, direct exposure to C16MImCl in culture medium confirmed 100% toxicity at the concentration used for impregnation, and only 8% toxicity at a tenfold lower concentration. **CONCLUSION:** The results indicate that C16MImCl-impregnated Twill and TNT-PE are non-toxic to HaCat cells. In contrast, impregnated TNT-PP displayed a distinct release profile, with marked toxicity evident as early as 4 hours, highlighting the need for concentration adjustments for safe application.

Keyword: Antimicrobial; In vitro Toxicity; Imidazolium Salts