

Research Compact

Tags

Octenidine, cytotoxicity

Title

Biocompatibility index of antiseptic agents by parallel assessment of antimicrobial activity and cellular cytotoxicity

Authors

Gerald Müller & Axel Kramer*

*Institute of Hygiene and Environmental Medicine, University of Greifswald, W.-Rathenau-Str. 49a, D17487 Greifswald, Germany

Source

2008, Journal of Antimicrobial Chemotherapy, DOI: [10.1093/jac/dkn125](https://doi.org/10.1093/jac/dkn125)

Aim of the study

Both microbicidal activity and *in-vitro* cellular toxicity must be taken into account when considering the suitability of an antiseptic agent. The Biocompatibility Index (BI), defined in this study, is a theoretical value that can be used to compare antiseptic substances. An antiseptic with a BI greater than 1 determines that it has effective microbicidal activity as well as a relatively low cytotoxicity to animal cells. This study assigns a BI value to a range of antiseptic substances.

Methods

For the analysis of cytotoxicity, murine fibroblast cells were incubated with each test antiseptic. After removal of the antiseptic, the cells were dyed to determine viability. To ascertain microbicidal efficacy, quantitative suspension tests according to EN 1040 were performed with *S. aureus* and *E. coli*. The number of viable microorganisms after incubation with each antiseptic was compared to a control.

Results

The ranking for the biocompatibility of tested antiseptic substances can be seen in Table 1. Octenidine (OCT), and polyhexanide (PHMB) were the only test agents to achieve a BI value greater than 1, demonstrating that their efficacy against the test germs was greater than their cytotoxicity towards animal cells. OCT showed the best efficacy against *S. aureus* within 30 minutes of exposure.

Table 1: biocompatibility of antiseptic substances

| Substance | BI [30 min] | |
|-------------------|--|---|
| | IC ₅₀ / RF - <i>E. coli</i> | IC ₅₀ / RF - <i>St. aureus</i> |
| Octenidine | 1.73 | 2.11 |
| Polyhexanide | 1.51 | 1.36 |
| Chlorhexidine | 0.83 | 0.98 |
| PVP-Iodine | 0.68 | 0.68 |
| Triclosan | 0.23 | 0.46 |
| Ag-Protein | 0.22 | 0.11 |
| Ag-Sulfadiazine | not calculable | |
| AgNO ₃ | not calculable | |

Conclusion

BI is a useful indicator in assessing the ability of an antiseptic to have good efficacy against microorganisms in a short period of time while simultaneously maintaining a relatively low cellular cytotoxicity. According to this index, octenidine shows the best ratio of microbicidal efficacy to tissue tolerability.