PHMB uptake in epicite^{hydro}®

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Introduction

Burn patients are especially prone to wound infections due to their vast wound areas. The rise of antimicrobial resistances worsens the fight to tackle such wound infections. Therefore, there is a need for novel antiseptic wound dressings. The loading of bacterial nano-cellulose (BNC)-base wound dressing with antiseptics has already been successfully performed but the described procedure is not applicable in a clinical emergency setting. Therefore, a clinically feasible approach was tested.

Material and methods

Sheets of epicite^{hydro}® were placed into antiseptic solutions containing PHMB (Prontosan® and LAVANID® 2) and were left to soak for up to two hours. At different time points (10, 20, 30, 60 and 120min), punch biopsies were taken and analysed for their concentrations of PHMB via spectrophotometry. To test the antimicrobial efficacy an agar diffusion assay with Staph. aureus was performed. The punch biopsies of the soaked BNC dressing were placed on the agar plate and were incubated overnight at 37°C.

Results

Already after 30 minutes, clinically relevant concentrations of PHMB were measured in epicite^{hydro}®. The 30-minute PHMB uptake for Prontosan® and LAVANID® 2 resulted in concentrations of 0.05 % and 0.019 %, respectively. The maximum uptake from Prontosan® and LAVANID® 2 reached 95 % and 76 %, respectively. The agar diffusion assay results showed a good antimicrobial efficacy of the BNC punches loaded with the antiseptics. The zone of inhibition around the BNC punches was larger with those, which had a longer uptake-period.

Conclusion

This experiment showed that the loading of BNC-based wound dressings with PHMB-containing antiseptics can be achieved by a simple and time-saving procedure. No special equipment or training is needed. A PHMB concentration already as low as 0.001 % inhibits all bacterial growth (1), indicating that the 30 minutes concentrations of PHMB in epicite^{hydro}® are far higher than the minimal inhibitory concentration. Such a procedure to create an antimicrobial wound dressing on demand and in relatively short time could be useful in an emergency setting where there is only a short time to prepare the needed amounts of antiseptic wound dressing.

(1) Hirsch T et al. Evaluation of toxic side effects of clinically used skin antiseptics in vitro. J Surg Res. 2010;164(2):344–50.