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Alginate Nanocomposite Wound Dressings with Sustained Antiseptic Release.

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Non-healing chronic wounds represent a significant burden on health services and infection can more than double a patients treatment costs. The regular topical antiseptic treatment disturbs the wound bed and can further delay healing.[1] Incorporating chlorhexidine hexametaphosphate nanoparticles (CHX-NPs)[2] within dressing materials could offer sustained antiseptic delivery and reduce dressing change frequency.

Alginate was dissolved in dilute CHX-NPs suspensions,[2] cast into thin films and dried at dopings of 0 & 6 wt% CHX-NPs. 'Tegaderm Ag' (3M) was also tested. Disks (ø = 10 mm) were cut and some aged by soaking in water (7 d.). Disks were cultured (37°C, 24 h) in nutrient broth with methicillin-resistant S*taphylococcus aureus* (MRSA) bacterial suspension. The culture was discarded and each disk vortexed to dislodge any bacteria contained within and serial dilutions (10^{-1}-10^{-12}) were prepared (PBS).

6 wt% CHX-NPs reduced bacterial loads at 1 day to the host-manageable 10^5 CFU mL^{-1} range, which raises wound closure success from 19 to 94%.[3] Tegaderm Ag killed 100% of bacteria at 1 day. Aged CHX-NPs again significantly reduced the bacterial load whilst the aged commercial antibacterial dressing offered no antimicrobial function.

Hydrated dressings such as alginates are ideal for drug delivery since they provide targeted transport to the treatment site. Encasing CHX-NPs within the material structure has allowed sustained antiseptic release at a therapeutic level. This could reduce dressing changes and be hugely beneficial for patients suffering with long-term chronic wounds.

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