

Title

Treatment of Diabetic Wounds Using Dissolvable Microneedle Patches Co-Delivering Levofloxacin and Lidocaine

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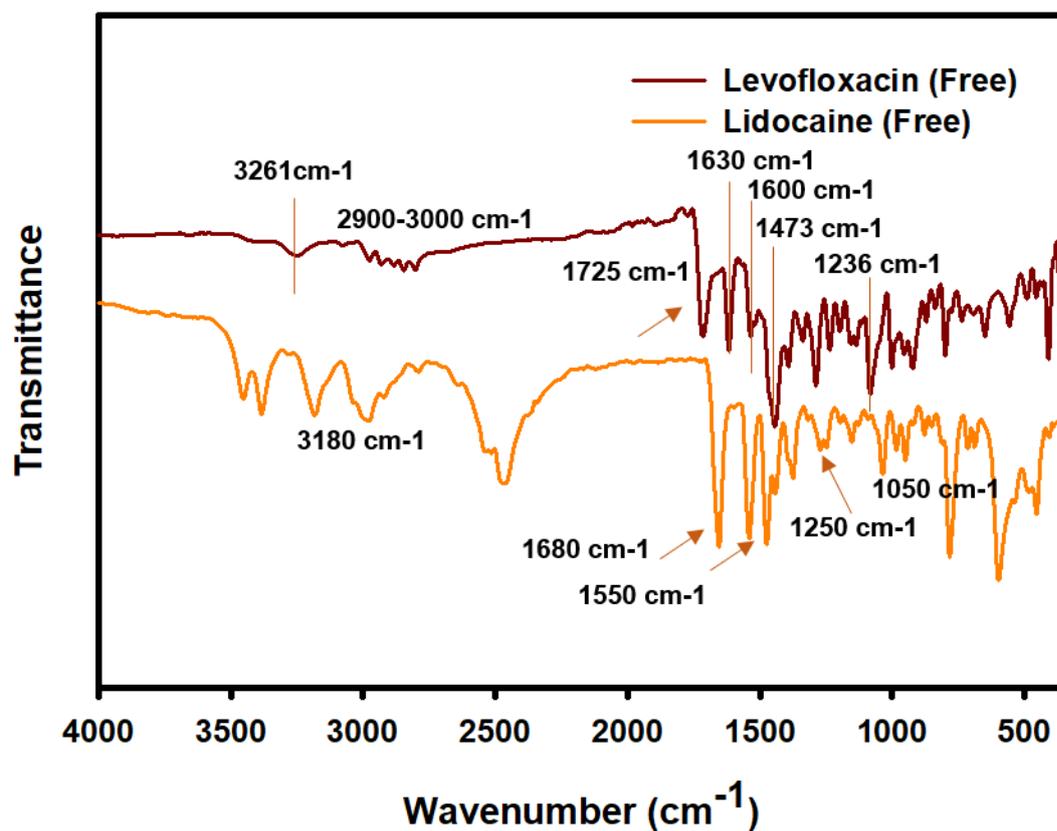


Figure S1. FTIR spectral analysis of active pharmaceutical ingredients (APIs). FTIR transmittance spectra of free levofloxacin and lidocaine, showing their characteristic peaks.

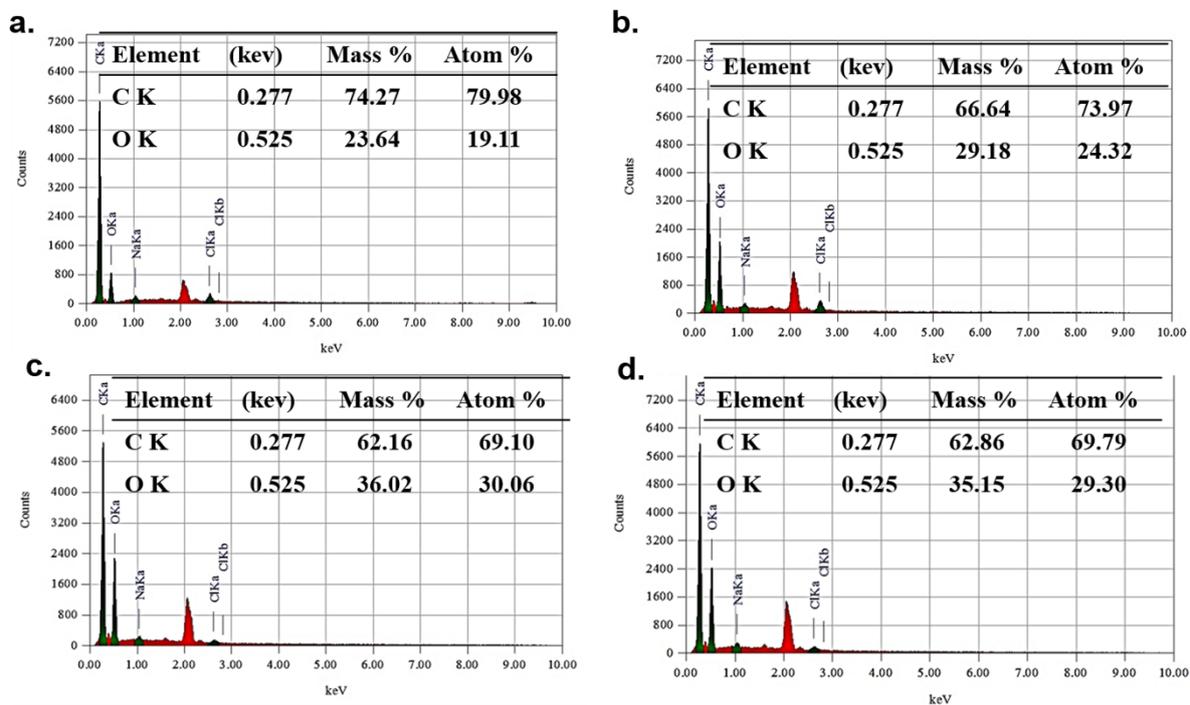


Figure S2. Elemental composition analysis using EDX spectroscopy. (a) EDX spectra of blank MNP, (b) Levofloxacin-loaded MNP, (c) Lidocaine-loaded MNP, and (d) Levofloxacin/lidocaine-loaded MNP.

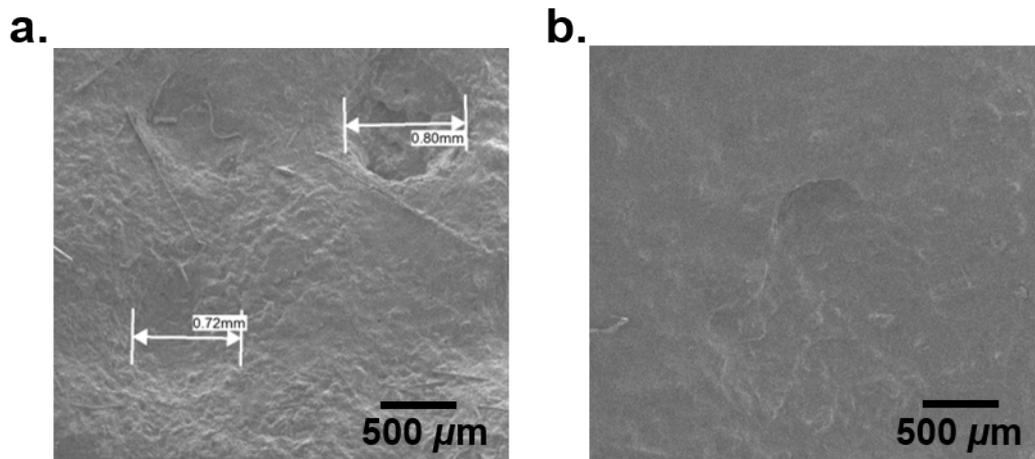
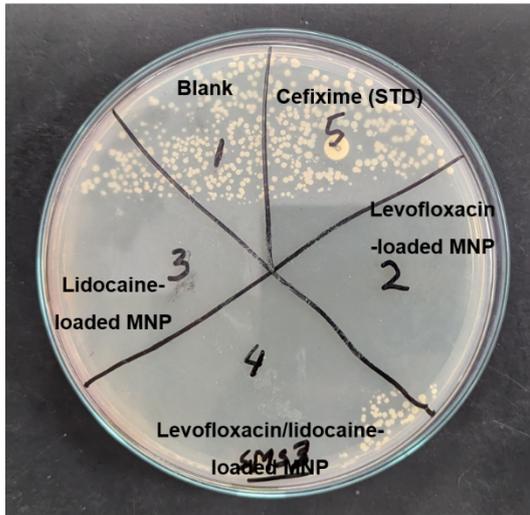


Figure S3. SEM images during *in vitro* drug release study from levofloxacin/lidocaine-loaded MNPs at pH 5.5. (a) SEM image of levofloxacin/lidocaine-loaded MNPs at 1 minute and (b) at 30 minutes during the drug release study. Scale bar represents 500 μm .

a.



b.

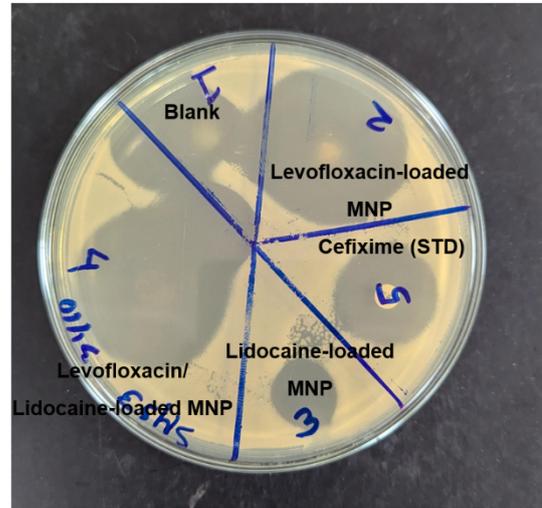


Figure S4. *In vitro* antimicrobial activity of microneedle patches (MNPs) against *E. coli* and *S. aureus*. (a, b) Representative images of agar diffusion assay results showing the antimicrobial activity of the same formulations against (a) *E. coli* and (b) *S. aureus*.

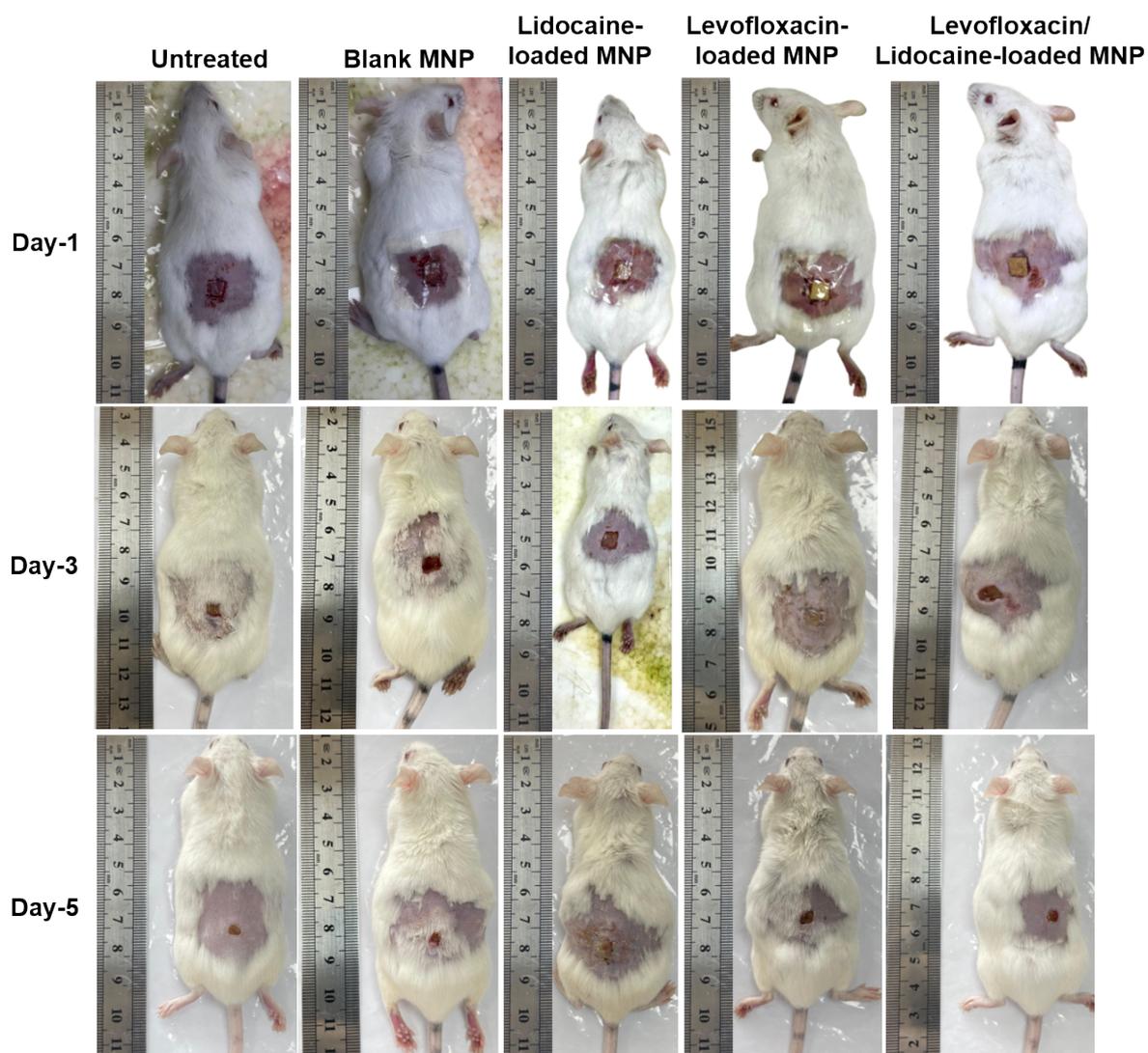


Figure S5. Wound recovery of mice skin following different treatments. Photographic images showing the wound healing process in mice treated with (a) no treatment, (b) blank MNP, (c) levofloxacin-loaded MNP, (d) lidocaine-loaded MNP, and (e) levofloxacin/lidocaine-loaded MNP at days 1, 3, and 5 post-treatment.