Electronic Supplementary Information (ESI)

Balancing Antimicrobial Activity with Biological Safety: Bifunctional Chitosan Derivative for the Repair of Wounds with Gram-positive Bacterial Infections

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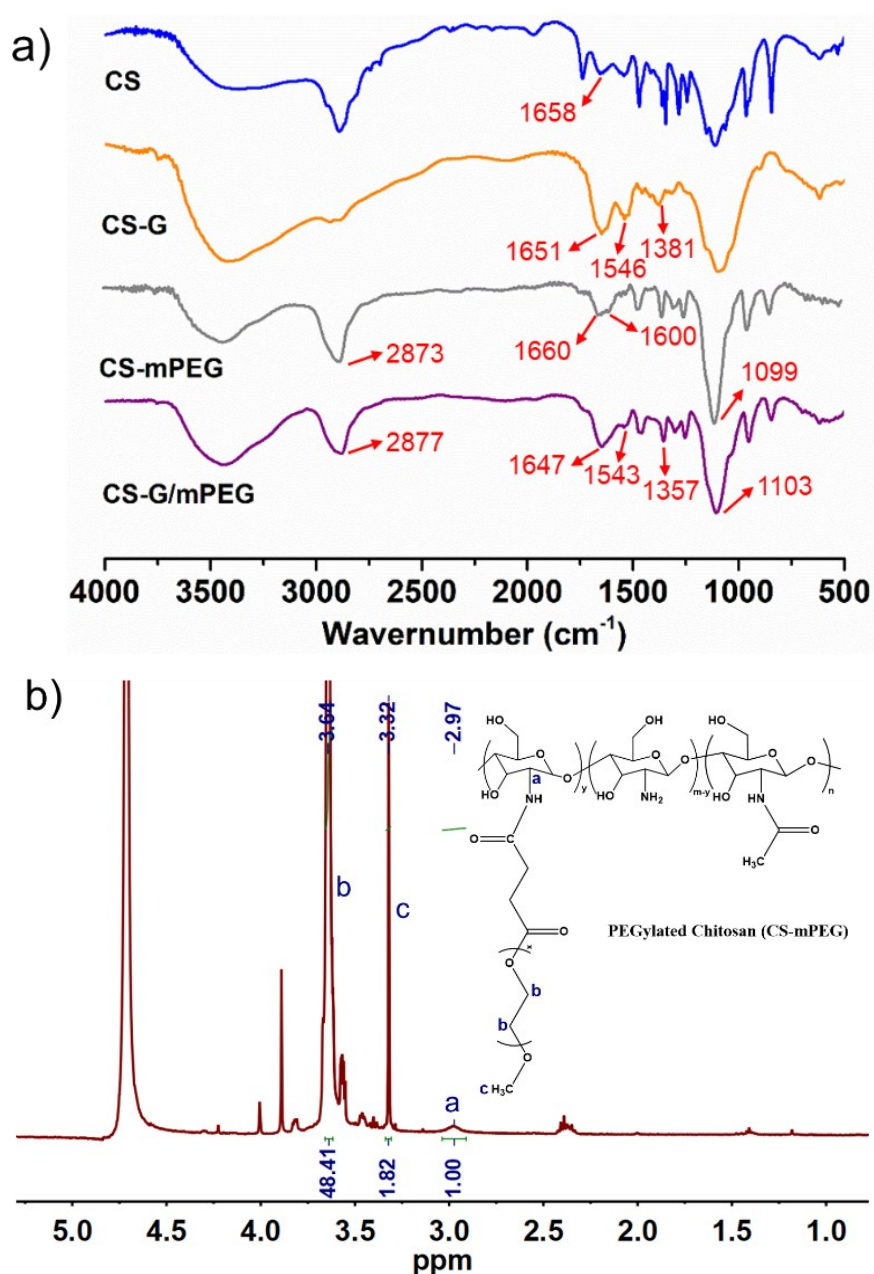
Figure S1. Characterization of chitosan and its derivatives. a) FTIR spectra and b) ^{1}H-NMR spectra analysis of CS-mPEG.
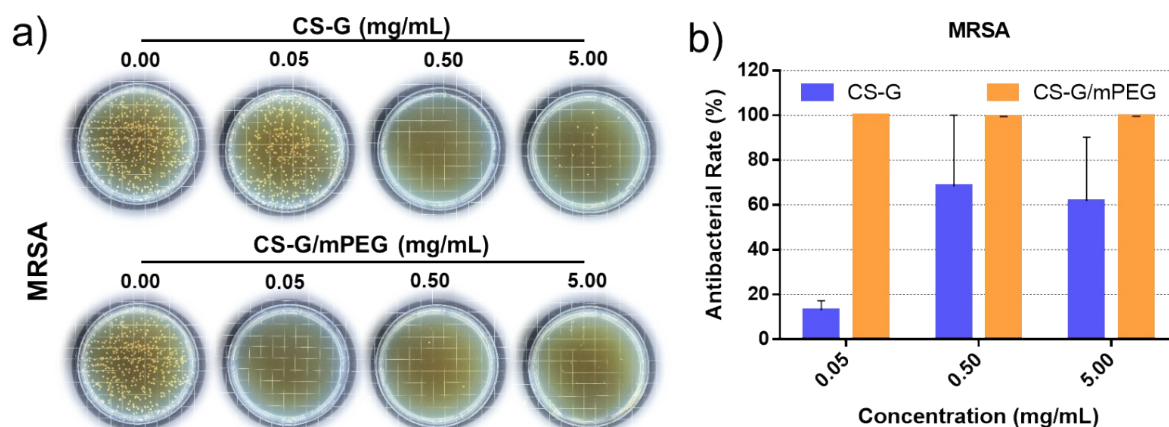
Figure S2. Testing antibacterial activity of modified chitosan CS-G and CS-G/mPEG. a) Typical photographs of microorganism colonies for MRSA treated with different polymer solutions on agar culture plates. b) Corresponding statistical histogram were graphed by prism software.
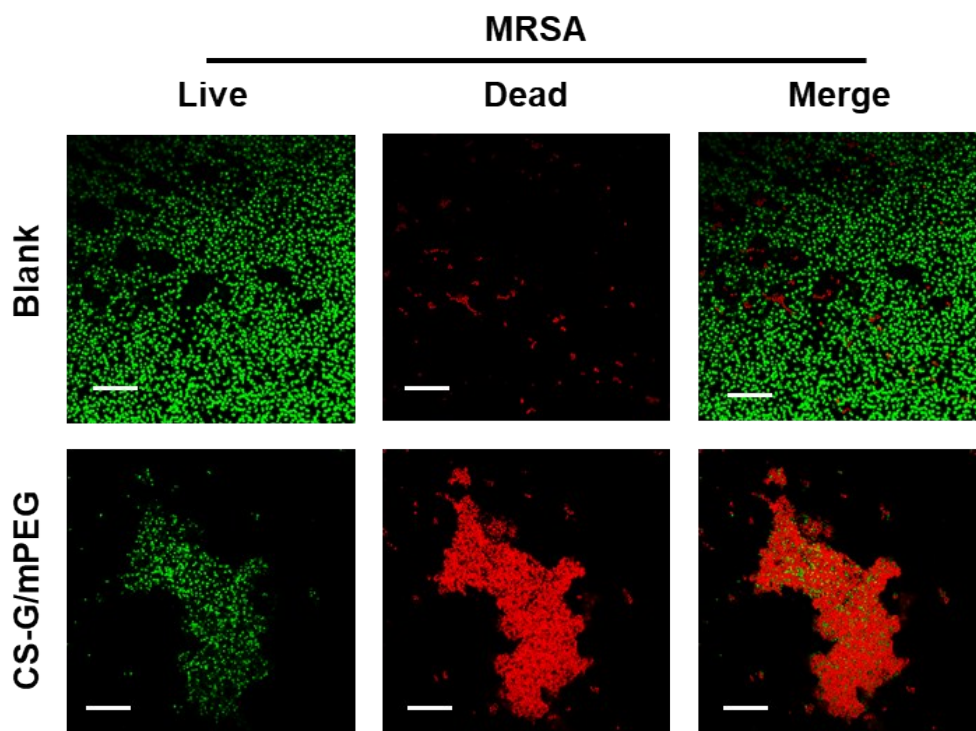

Figure S3. Confocal fluorescence microscopic images of MRSA cells treated with CS-G/mPEG (0.50 mg mL^{-1}) for 1 h. Cells were stained (for 15 min) with SYTO9 (green) and PI (red) for antimicrobial activity. Assay without CS-G/mPEG is as blank. (Scale bar: 20 μm)
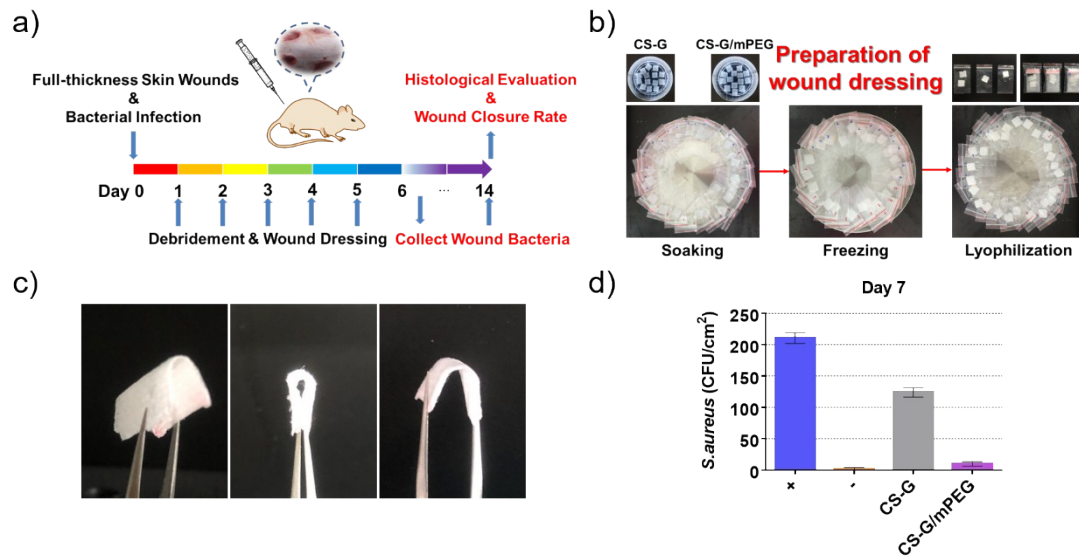
Figure S4. Infection control and healing promotion of modified chitosan *in vivo*. a) The protocol of bacterium-infected model establishment, including bacterial inoculation, treatment and harvest to figure out the histological evaluation antimicrobial rate and wound closure rate. b) Preparation of simple wound dressing based on CS-G and CS-G/mPEG. After soaking, freezing and lyophilization, dry clean simple wound dressings were obtained. c) Mechanical property of the wound dressings: modified chitosan attached clean wiper® was still soft enough to bend. d) Statistical histogram of the wound bacteria on day 7 postoperation were graphed by prism software.
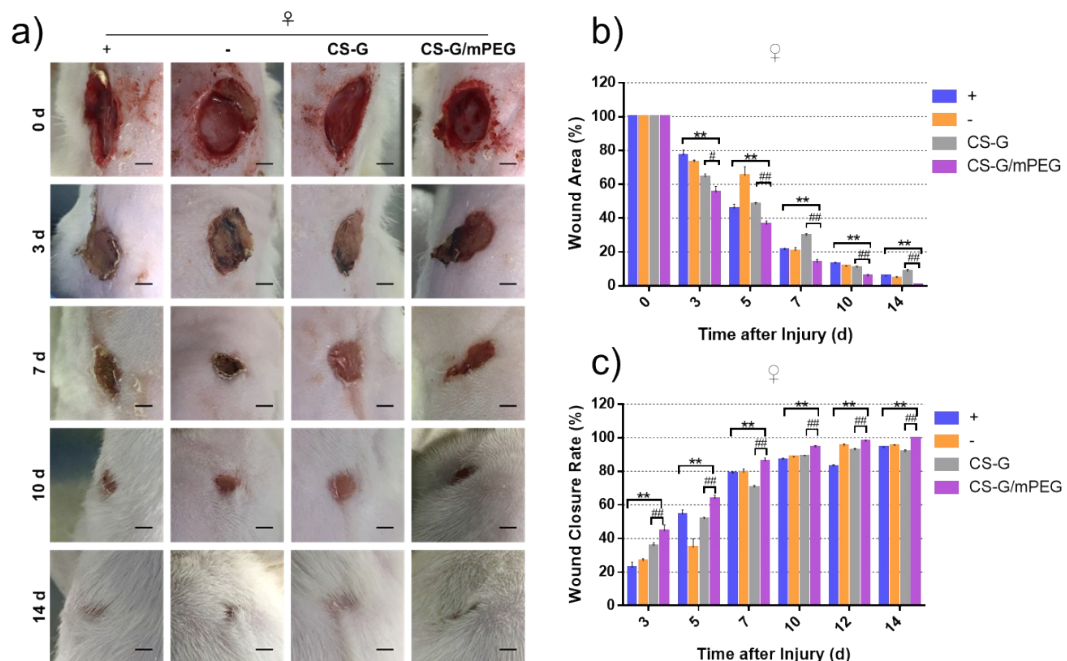

Figure S5. The wound healing processes under treatments of CS-G or CS-G/mPEG. a) Photographs of the appearance of different wounds on days 1, 3, 7, 10 and 14 postoperation with or without the treatment of the chitosan derivatives. +, -, CS-G, CS-G/mPEG group represent infected wounds without treatment, uninfected wounds without treatment, infected wounds treated with CS-G and infected wounds treated with CS-G/mPEG, respectively. (Scale bar: 5 mm) b) The proportion of the wound area on different days postoperation. c) The wound closure rate of different wounds on different days postoperation. (*, # represent: $p < 0.05$; **, ## represent: $p < 0.01$)