



Preparation and evaluation of S-nitrosoglutathione-loaded polymeric microparticles for the treatment of MRSA-infected wounds

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Abstract

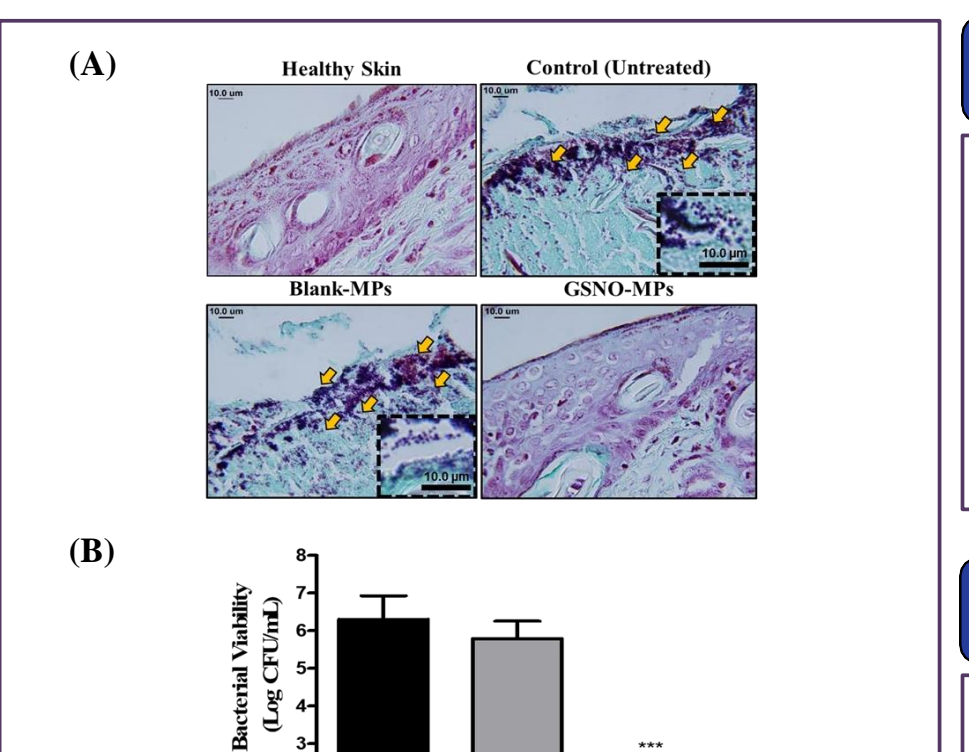
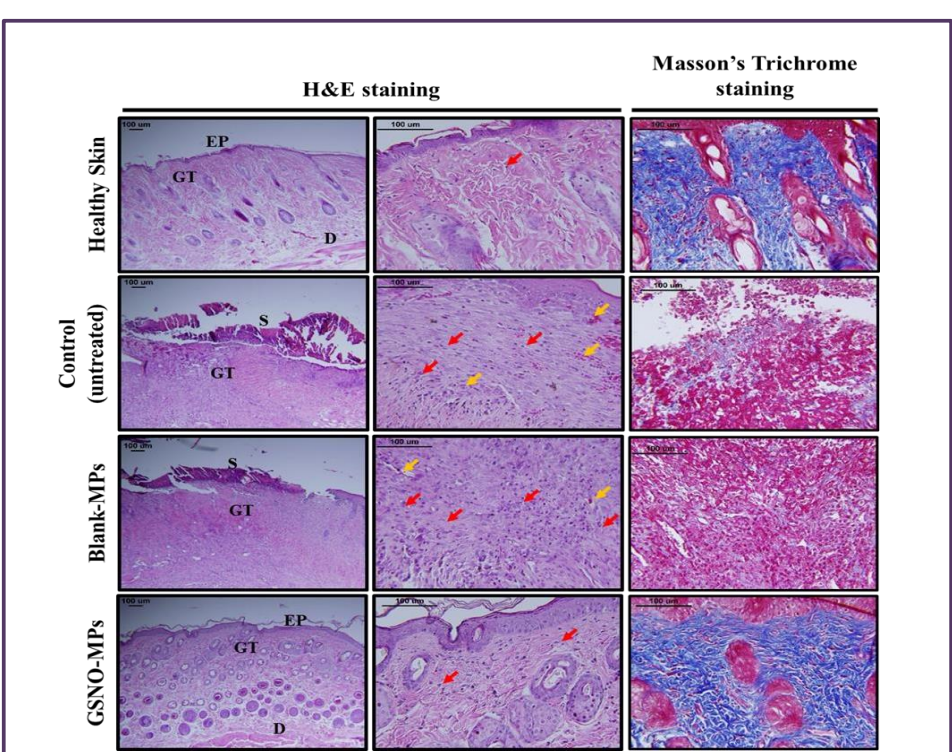
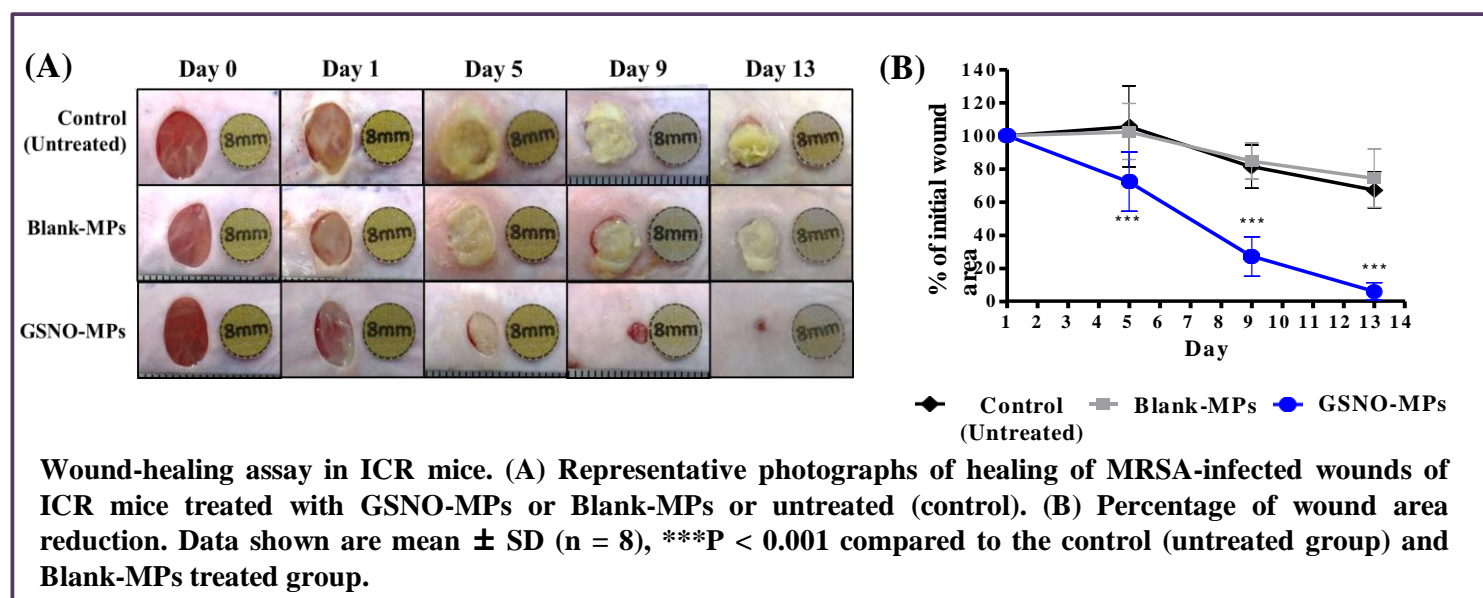
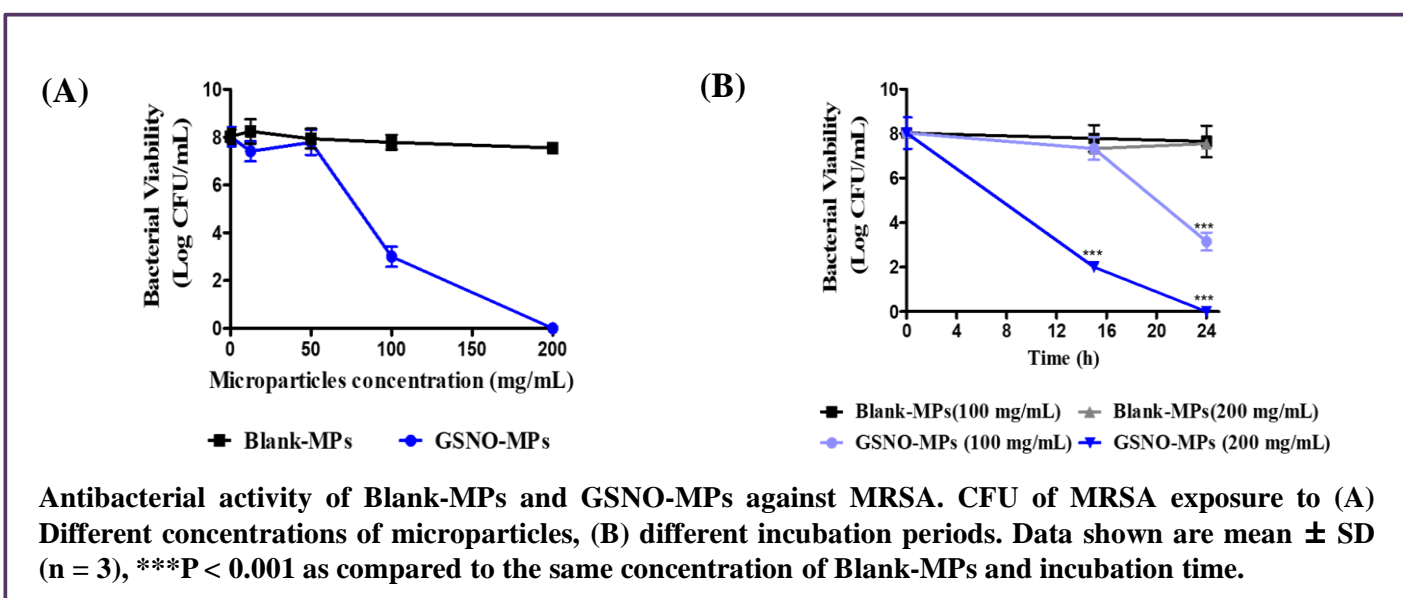
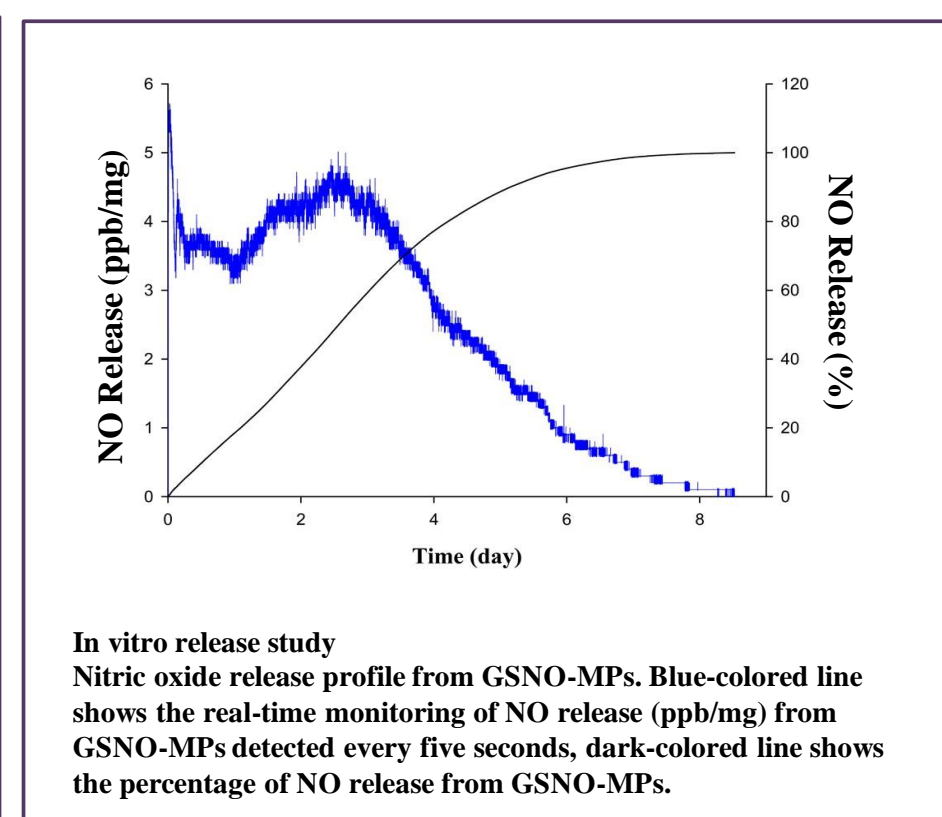
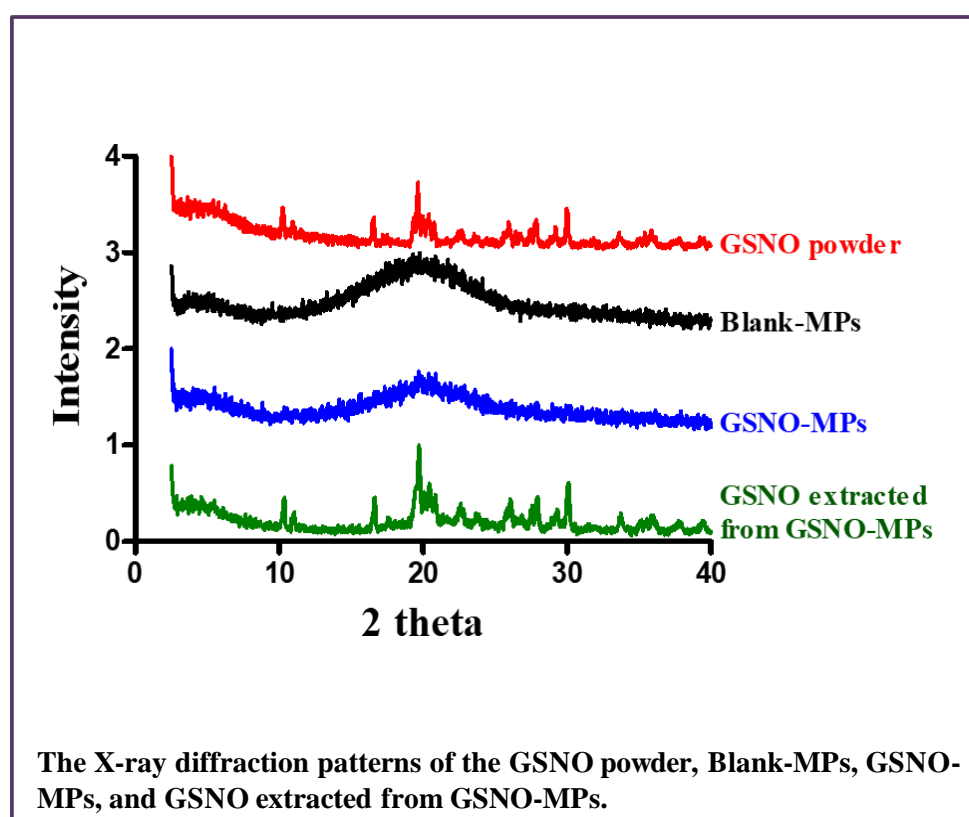
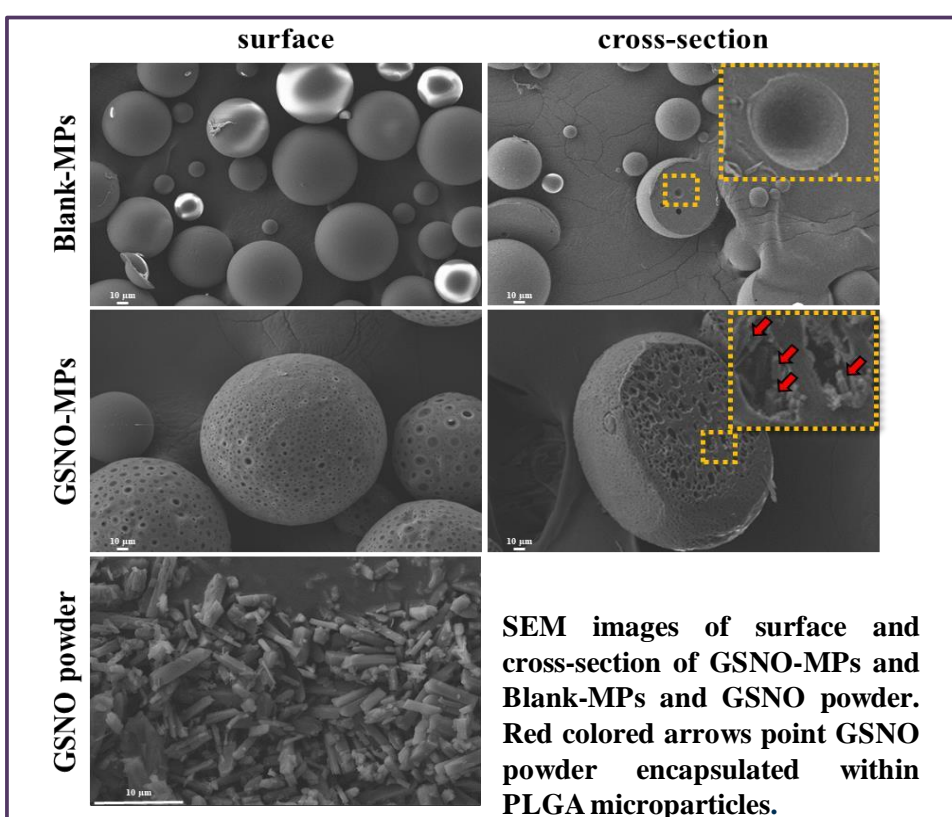
Purpose

Bacterial infection retards and impairs wound healing process, often leading to a chronic wound. Thus, eradication of bacteria in wounds is a first line treatment to improve wound healing process. Nitric oxide (NO) is a gas molecule that exhibits both antibacterial and wound healing activities; however, a short half-life of NO and poor stability of NO donors in biological environments limit a clinical use of NO. In this study, we encapsulated hydrophilic endogenous nitric oxide donor, S-nitrosoglutathione (GSNO), into poly (lactic-co-glycolic acid) (PLGA) microparticles for controlled release of NO for a prolonged period to treat MRSA infected wounds.

Method

- 1) GSNO powder was loaded into PLGA microparticles by using a solid-in-oil-in-water (S/O/W) emulsion solvent evaporation method.
- 2) The morphology of GSNO-loaded PLGA microparticles (GSNO-MPs) was examined by scanning electron microscopy (SEM) and particle size was measured by using ImageJ software and X ray diffraction pattern.
- 3) Quantitative NO release was measured by chemiluminescence.
- 4) In vitro antibacterial activity of microparticles was tested against Gram-positive bacteria methicillin-resistant Staphylococcus aureus (MRSA) which abundantly found in wound infections.
- 5) MRSA infected deep wounded mouse model was used for in vivo wound healing study. Histological analysis of wound was done by H&E staining, Masson's Trichome staining and Twort's gram staining.

Results



Conclusion

In this study, hydrophilic NO donor (GSNO) was successfully encapsulated into polymeric microparticles which showed sustained NO release and enhanced antibacterial activity and wound healing. Based on the results, sustained NO-releasing biodegradable microparticles could be a promising approach for the treatment of infectious wounds.

Acknowledgments

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