

EUTECTODERM: DEEP EUTECTIC SOLVENT FOR TOPICAL TREATMENT OF WOUNDS

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INVENTION NOVELTY

The invention introduces a pharmaceutically exploitable deep eutectic solvent (DES) composed of thymol and betaine for the treatment of dermatological conditions, particularly infected and non-infected acute and chronic wounds. The present work demonstrates that specific thymol:betaine (THY:BET) molar ratios exhibit unexpectedly strong antimicrobial and anti-inflammatory activity against clinically relevant pathogens such as MRSA, *P. aeruginosa* and *E. coli* in human ex vivo wound infection models, clearly outperforming reference products like silver dressings and a standard wound gel. At the same time, the invention reveals that a very short topical application in a mouse wound model, followed by removal of the liquid, preserves this antimicrobial efficacy while markedly reducing cytotoxicity and tissue damage. Furthermore, the THY:BET system is shown for the first time to act as a high-capacity solvent for poorly water-soluble natural antioxidants and anti-inflammatory molecules, enabling multifunctional formulations that combine antimicrobial, anti-inflammatory and pro-regenerative activities in a single biodegradable platform.

VALUE PROPOSITION

This technology offers a new therapeutic option for the management of difficult-to-treat wounds and inflammatory or infectious skin conditions, addressing major clinical and economic burdens associated with chronic ulcers, postoperative infections and multidrug-resistant pathogens. The THY:BET DES provides rapid biofilm penetration and broad-spectrum antimicrobial action with demonstrably low cytotoxicity under a short contact protocol. This supports shorter treatment times, simpler application schemes and improved patient comfort, while reducing dependence on systemic or topical antibiotics and thereby contributing to antimicrobial stewardship. Overall, the invention delivers a clinically relevant, scalable and environmentally favorable alternative to conventional antiseptics and silver- or antibiotic-based wound therapies.

