Pharmaceutical Nanotechnology

**In Vitro Evaluation of Novel Phenytoin-Loaded Alkyd Nanoemulsions Designed for Application in Topical Wound Healing**

- Siew Yong Teo¹,
- Mei Yeng Yew²,
- Siang Yin Lee³,⁴,⁵,
- Michael J. Rathbone¹,⁵,
- Seng Neon Gan⁶,
- Allan G.A. Coombes³

Show more
Choose an option to locate/access this article:

- [Get Full Text Elsewhere](http://dx.doi.org/10.1016/j.xphs.2016.06.028)

**Abstract**

Phenytoin-loaded alkyd nanoemulsions were prepared spontaneously using the phase inversion method from a mixture of novel biosourced alkyds and Tween 80 surfactant. Exposure of human adult keratinocytes (HaCaT cells) for 48 h to alkyd nanoemulsions producing phenytoin
concentrations of 3.125-200 μg/mL resulted in relative cell viability readings using tetrazolium dye 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide of 100% confirming nontoxicity and suggesting cell proliferation activity. Phenytoin-loaded alkyd nanoemulsions generally resulted in higher mean cell viability compared with equivalent concentration of phenytoin solutions, suggesting that the nanoemulsions provided a controlled-release property that maintained the optimum phenytoin level for keratinocyte growth. HaCaT cell proliferation, measured by 5-bromo-2-deoxyuridine uptake, was found to increase following exposure to increasing phenytoin concentration from 25 to 50 g/mL in solution or encapsulated in nanoemulsions but declined at a drug concentration of 100 g/mL. An in vitro cell monolayer wound scratch assay revealed that phenytoin solution or nanoemulsions producing 50 g/mL phenytoin concentration resulted in 75%-82% “scratch closure” after 36 h, similar to medium containing 10% fetal bovine serum as a cell growth promoter. These findings indicate that phenytoin-loaded alkyd nanoemulsions show potential for promoting topical wound healing through enhanced proliferation of epidermal cells.

Keywords

- alkyd nanoemulsion;
- phenytoin;
- topical;
- wound healing

Conflicts of interest: The authors declare no conflicts of interest in this research study.

Correspondence to: Siang Yin Lee (Telephone: +603 6145 9491; Fax: +603 6156 4967).

© 2016 American Pharmacists Association®. Published by Elsevier Inc. All rights reserved.

Note to users:
Corrected proofs are Articles in Press that contain the authors' corrections. Final citation details, e.g., volume and/or issue number, publication year and page numbers, still need to be added and the text might change before final publication.

Although corrected proofs do not have all bibliographic details available yet, they can already be cited using the year of online publication and the DOI, as follows: author(s), article title, Publication (year), DOI. Please consult the journal's reference style for the exact appearance of these elements, abbreviation of journal names and use of punctuation.

When the final article is assigned to volumes/issues of the Publication, the Article in Press version will be removed and the final version will appear in the associated published volumes/issues of the Publication. The date the article was first made available online will be carried over.