A Zaid Alkilani et al., Pharmaceut Reg Affairs 2018, Volume 7
DOI: 10.4172/2167-7689-C1-031

15th Annual European Pharma Congress

May 07-09, 2018 | Frankfurt, Germany

Electrically responsive hydrogel films mediated iontophoretic transdermal drug delivery

A Zaid Alkilani[1], **R Thakur**[2] and **R F Donnelly**[2]
[1]Zarqa University, Jordan
[2]Queen's University Belfast, UK

Hydrogels that are used for biomedical purposes such as controlled drug delivery systems should be biocompatible and often biodegradable. Depending upon the hydrogel type, their swelling ratios are dramatically changed, due to changes in external pH, temperature, ionic strength and electromagnetic radiation. This study describes the effect of hydrogel crosslink density upon the swelling kinetics and electro-responsive nature of the hydrogel, such that a formulation with the highest degree of swelling and greatest enhancement in solute permeation following the application of an electric current could be identified for subsequent microneedle (MN) production. The intention is to obtain electrically responsive hydrogel systems suitable for the production of a novel hydrogel forming, MN mediated iontophoretic transdermal drug delivery. In order to achieve hydrogels with good mechanical properties to be used as MN, network parameters, ionic conductivity, solute permeation, the mechanical and electrical properties of hydrogel films were investigated. Based upon the equilibrium swelling and ionic conductivity studies, a formulation producing a hydrogel of high swelling and conductivity at F7 6 hrs, F16 6 hrs, and F18 were identified to investigate the effect of electric current upon the electro-responsive nature of these hydrogel systems. In conclusion, the more open network structure of low crosslink density hydrogels enables solute permeation to occur more readily and the greater ionic conductivity of these formulations allows a greater solute permeation enhancement to occur when subjected to an external electric field.

Recent Publications

1. Singh T R R, McMillan H, Mooney K, Alkilani A Z and Donnelly R F (2017) Fabrication of microneedles in percutaneous penetration enhancers physical methods in penetration enhancement. Springer Berlin Heidelberg 305323.
2. Eltayib E, Brady A J, Caffarel-Salvador E, Gonzalez-Vazquez P, Alkilani A Z, et al. (2016) Hydrogel-forming microneedle arrays: potential for use in minimally-invasive lithium monitoring. *European Journal of Pharmaceutics* and *Biopharmaceutics* 102:123–31.
3. Alkilani A Z, McCrudden M T and Donnelly R F (2015) Transdermal drug delivery: Innovative pharmaceutical developments based on disruption of the barrier properties of the stratum corneum. Pharmaceutics 7(4):438–470.
4. McCrudden M T, Alkilani A Z, Courtenay A J, McCrudden C M, McCloskey B, et al. (2015) Considerations in the sterile manufacture of polymeric microneedle arrays. Drug Delivery and Translational Research 5(1):3–14.
5. Donnelly R F, McCrudden M T, Alkilani A Z, Larrañeta E, McAlister E, et al. (2014) Hydrogel-forming microneedles prepared from "super swelling" polymers combined with lyophilised wafers for transdermal drug delivery. PLoS One 9(10):e111547.

Biography

A Zaid Alkilani is an Assistant Professor, Dean of the Faculty of Pharmacy, Zarqa University, Jordan. She graduated from Jordan University, College of Pharmacy in 2006. Then she obtained her MSc Degree in Pharmaceutical Science from Jordan University in 2010. After that she completed her PhD in Drug Delivery and Pharmaceutical Technology at the Faculty of Pharmacy, Queen's University of Belfast, United Kingdom in 2013. Her research interests in the field of Transdermal Drug Delivery, Microneedle, Controlled Release, Formulations and Iontophoresis. She has presented her work at many international conferences such as, Proceedings of the 2nd International Conference on Microneedles, Cork, Ireland; Proceedings of the 2013 UKICRS Symposium, Belfast; UK, Proceedings of the UK PharmSci Conference, Nottingham.UK; Stratum Corneum VIII Conference, Cardiff, UK; 8th International Conference and Exhibition on Pharmaceutics and Novel Drug Delivery Systems 2016, Madrid, Spain and 6th FIP Pharmaceutical Sciences World Congress 2017, Stockholm, Sweden.

ahlamk@zu.edu.jo