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A.A. Amarah, D.G. Petlin, J.E. Grice, J. Hadgraft, M.S. Roberts, Y.G. Anissimov

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Compartmental modeling of skin transport

A.A. Amarah[1,2], D.G. Petlin[1,3], J.E. Grice[4], J. Hadgraft[5], M.S. Roberts[4,6], Y.G. Anissimov[1,7*]

[1]School of Environment and Science, Griffith University, Gold Coast, Queensland, 4222, Australia

[2] University of Basrah, College of Science, Physics Department, Basrah, Iraq

[3]Tomsk Polytechnic University, 30 Lenin Avenue, Tomsk 634050, Russian Federation

[4]Therapeutics Research Centre, The University of Queensland Diamantina Institute, Translational Research Institute, Brisbane, 4102, Australia

[5]UCL School of Pharmacy, 29-39 Brunswick Square, London WC1N 1AX, United Kingdom

[6]Sansom Institute, School of Pharmacy and Medical Sciences, University of South Australia, Adelaide, SA, Australia

[7]Institute of Molecular Medicine, Sechenov First Moscow State Medical University, Moscow, Russia

* Correspondence: email: y.anissimov@griffith.edu.au, phone: +617 55528496

Abstract

The primary objective of this study is to introduce a simple and flexible mathematical approach which models transport processes in skin using compartments. The main feature of the presented approach is that the rate constants for exchange between compartments are derived from physiologically relevant diffusional transport parameters. This allows for better physical interpretation of the rate constants, and limits the number of parameters for the compartmental model. The resulting compartmental solution is in good agreement with previously published solutions for the diffusion model of skin when ten or more compartments are used. It was found that the new compartmental model with three compartments provided a better fit of the previously publish water penetration data than the diffusion model. Two special cases for which it is difficult to implement the diffusion model were considered using our compartmental approach. In both cases the compartmental model predictions agreed well with the diffusion model.