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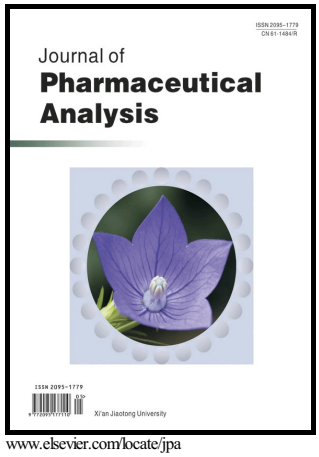

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ACCEPTED MANUSCRIPT

Effect of plasma surface treatment of poly(dimethylsiloxane) on the permeation of pharmaceutical compounds.

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Abstract

This paper addresses the modification of poly(dimethylsiloxane), i.e. PDMS, using plasma surface treatment and a novel application of the membrane created. A set of model compounds were analysed to determine their permeation through PDMS both with, and without, plasma treatment. It was found that plasma treatment reduced permeation for the majority of compounds yet had little effect for some compounds, such as caffeine, with results indicating that polarity plays an important role in permeation, as is seen in human skin. Most importantly, a direct correlation was observed between plasma-modified permeation data and literature data through calculation of membrane permeability (K_p) values implying plasma-modified silicone membrane (PMSM) could be considered a suitable *in vivo* replacement to predict clinical skin permeation.

Graphical abstract

Plasma-modified silicone membrane has been proven to be a suitable replacement for clinical studies when determining permeation of compounds through the skin. This is the first study to propose that by modifying the surface with plasma treatment, it becomes far more 'skin like' thus allowing it to be used in analytical applications as a potential skin mimic system.

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