A Synthetic Membrane for Studying In Vitro Transdermal Penetration of Actives
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Purpose
To evaluate a new polymeric membrane for screening the transdermal permeability of topical drugs and drug formulations

Methods
In this study the permeation of selected drugs through a polyethersulfone (PES) synthetic membrane, human cadaver skin, and cellulose acetate membrane was investigated. The method utilized static vertical glass Franz diffusion cells with a donor area of 0.64 sq. cm and a receptor volume of 5 ml. Briefly, skin samples, or polymeric membranes were mounted on the Franz diffusion cells. All groups tested were n=6. The stirred receiver was filled with filtered phosphate buffered saline solution pH=7.4 and the temperature maintained at 37 0C. 300µl of either saturated drug solution (diclofenac sodium or nicotine) or various formulations were added to the donor. The formulations included nicotine patches (21mg), diclofenac sodium gel (Voltaren Gel,1% W/W). Receiver compartment samples were collected every hour for 8 hours. All samples were analyzed for drug content using validated HPLC protocols.

Results
It was observed that the flux values for diclofenac sodium and nicotine saturated solutions or finite doses or patch /gel formulations using the PES membranes were not significantly different to those for human cadaver skin. For example, the flux after 8 hours for saturated diclofenac sodium in PG was 66.6±44.0 µg/cm2 for human skin, 257.0±41.0 µg/cm2 for PES and 3054.0±267.0 µg/cm2 for cellulose membrane. Voltaren gel flux values after 8 hours for PES was 64.0±27.0 µg/cm2 and for human skin was 254.8±30.0 µg/cm2 and for cellulose acetate membrane was 2049±50.0 µg/cm2. Flux values for cellulose acetate membranes in all experiments were significantly higher than those for PES or human skin.

Conclusion
Data have shown that permeability of PES membrane is similar to that of human cadaver skin in vitro. Another advantage of PES membranes was that variability between samples was significantly reduced. Therefore, it was concluded that PES membranes could potentially be useful as a screening tool for initial evaluation of the permeability of topically applied drugs and drug formulations.