The Flux of Select NSAIDs through Silicone Membranes from Mineral Oil
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Purpose
The use of silicone membranes as a surrogate for skin in topical delivery testing has been previously shown to be useful when studying flux from water. However, the data are lacking for vehicles other than water.

Methods
The flux values for n=9 NSAIDs through silicone from mineral oil (log \( J_{\text{MPMO}} \)) were experimentally determined. This data was correlated to flux through human skin \textit{in vivo} from mineral oil (log \( J_{\text{MHMO}} \)) available in the literature. Experimental data was also correlated to calculated flux values utilizing various sets of Roberts-Sloan (RS) equation coefficients derived in the literature. Non-linear regressions were performed to calculate coefficients with the best fit for the experimental data.

Results
Correlation of log \( J_{\text{MPMO}} \) to log \( J_{\text{MHMO}} \) was fair (\( r^2=0.647 \)) but was improved with removal of outlier compound Nabumetone (\( r^2=0.858 \)). Flux of Nabumetone was considerably lower than expected and this discrepancy is currently being investigated. Correlations between log \( J_{\text{MPMO}} \) and log \( J_M \) calculated from coefficients determined from the fit of flux from water data to RS yielded generally poor results (\( r^2=0.241-0.341 \)). Similar comparisons using coefficients from the limited mineral oil data available in the literature, one human skin \textit{in vitro} study and one human skin \textit{in vivo} study, yielded varying correlations (\( r^2=0.398 \) and \( r^2=0.832 \), respectively). Non-linear regressions performed on the experimental log \( J_{\text{MPMO}} \), log \( S_{\text{MO}} \), and log \( S_{7.4} \) gave new coefficients from the fit of this new data to RS. Linear plots of log \( J_{\text{MPMO}} \) and log \( J_M \) calculated with the new coefficients gave a correlation of \( r^2=0.911 \) for the n=8 dataset.

Conclusion
Flux through silicone membranes appears promising for correlation with flux through human skin \textit{in vivo} from mineral oil. However, the dataset needs to be expanded with more compounds to account for possible outliers before silicone membranes can be useful as a surrogate for flux from mineral oil in topical delivery studies.