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## TITLE

### ASSESSING BA/BE OF TOPICAL FORMULATIONS IN VITRO: IN VITRO - IN VIVO CORRELATION PROVIDES A PRACTICAL SURROGATE TO CLINICAL BE STUDIES

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Regulatory approval processes for bioequivalent topical products often require clinical efficacy trials. The U.S. Food, Drug and Cosmetic Act, and associated regulations, allow for utilization of alternative *in vitro* and *in vivo* methods for assessing bioequivalence of topical dosage forms. Yet to date, the vasoconstrictor assay for topical glucocorticoids is the only approved surrogate method, despite the fact that there are multiple definitive and discriminating alternative methods currently available. For example, a substantial body of data demonstrates that *in vitro* percutaneous absorption in excised human skin on Franz cells shows excellent correlation with absorption in living man. When *in vitro* studies are conducted under parameters that match *in vivo* conditions, the average IVIV ratio is very close to one (0.96) with a range 0.58 - 1.28. A critical component of IVIV correlation is studying the matched body site. This correlation has been consistently demonstrated in numerous well matched *in vitro* - *in vivo* studies, where test and reference formulations were found to be equally bioavailable *in vitro*, and validated when subsequent clinical evaluation found those products to be bioequivalent. Correlation of bioequivalence has been shown both, with quantitative *in vivo* pharmacokinetics of total absorption, and with qualitative pharmacodynamic clinical endpoints like the vasoconstrictor score and therapeutic efficacy. For regulatory approval, the *in vitro* excised skin data need not be relied upon in isolation to determine bioequivalence, but should be considered as an informative supplement to results from other methods currently available, as part of a hierarchical approach to determining bioequivalence.