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## Topical Drug Delivery: Challenges, Opportunities, Novel Approaches and Recent Advances

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### Message from the Guest Editors

Topical drug delivery refers to the delivery of drugs via skin and is considered an attractive alternative to oral and parenteral routes. Topical drug delivery has advantages, such as non-invasive delivery, bypass of first pass metabolism, prolonged duration of action, reduced dosing frequency, constant levels of drug in the plasma, reduced drug toxicity/adverse events, and improved patient compliance. However, development of a new topical product is very challenging as skin acts as a major barrier for entry of drugs and foreign materials into the body. In addition to skin, other factors, such as physicochemical parameters of the drug (solubility, molecular weight or size, and hydrogen bonding) and formulation characteristics influence the performance of a topical drug product. Several approaches have been investigated in the literature to address these challenges, which include physical methods (iontophoresis, thermal ablation, radiofrequency, etc.) chemical methods (use of permeation enhancers) and novel formulation approaches (microneedles, nano-formulations, lipid-based drug delivery systems).



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