successful pathways (medicinal chemistry or formulation strategy) and are anticipated to increase the number of new APIs with good oral absorption being discovered.

Bharate, S. S. and R. A. Vishwakarma (2013). "Impact of preformulation on drug development." *Expert Opin Drug Deliv* 10(9):1239–1257.

INTRODUCTION: Preformulation assists scientists in screening lead candidates based on their physicochemical and biopharmaceutical properties. This data is useful for selection of new chemical entities (NCEs) for preclinical efficacy/toxicity studies which is a major section under investigational new drug application. A strong collaboration between discovery and formulation group is essential for selecting right NCEs in order to reduce attrition rate in the late stage development. AREAS COVERED: This article describes the significance of preformulation research in drug discovery and development. Various crucial preformulation parameters with case studies have been discussed. EXPERT OPINION: Physicochemical and biopharmaceutical characterization of NCEs is a decisive parameter during product development. Early prediction of these properties helps in selecting suitable physical form (salt, polymorph, etc.) of the candidate. Based on pharmacokinetic and efficacy/toxicity studies, suitable formulation for Phase I clinical studies can be developed. Overall these activities contribute in streamlining efficacy/toxicology evaluation, allowing pharmacologically effective and developable molecules to reach the clinic and eventually to the market. In this review, the magnitude of understanding preformulation properties of NCEs and their utility in product development has been elaborated with case studies.

Bhuptani, R. S. et al. (2016). "Transungual permeation: Current insights." *Drug Deliv Transl Res* 6(4):426–439.

Nail disorders are beyond cosmetic concern; besides discomfort in the performance of daily chores, they disturb patients psychologically and affect their quality of life. Fungal nail infection (onychomycosis) is the most prevalent nail-related disorder affecting a major population worldwide. Overcoming the impenetrable nail barrier is the toughest challenge for the development of efficacious topical ungual formulation. Sophisticated techniques such as iontophoresis and photodynamic therapy have been proven to improve transungual permeation. This article provides an updated and concise discussion regarding the conventional approach and upcoming novel approaches focused to alter the nail barrier. A comprehensive description regarding preformulation screening techniques for the identification of potential ungual enhancers is also described in this review while highlighting the current pitfalls for the development of ungual delivery.

Chadha, R. and S. Bhandari (2014). "Drug-excipient compatibility screening—Role of thermoanalytical and spectroscopic techniques." *J Pharm Biomed Anal* 87:82–97.

Estimation of drug-excipient interactions is a crucial step in preformulation studies of drug development to achieve consistent stability, bioavailability and manufacturability of solid dosage forms. The advent of thermoanalytical and spectroscopic methods like DSC, isothermal microcalorimetry, HSM, SEM, FT-IR, solid state NMR and PXRD into pre-formulation studies have contributed significantly to early prediction, monitoring and characterization of the active pharmaceutical ingredient incompatibility with pharmaceutical excipients to avoid expensive material wastage and considerably reduce the time required to arrive at an appropriate formulation.