Practical applications of precision medicine in Psoriasis

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Letter to Editor

The high prevalence of psoriasis creates a significant barrier for the global healthcare system, affecting nearly 7.4 million US adults with direct treatment costs accumulating to over $12 billion annually [1]. Biologic drugs have become a major component of psoriasis management, with anti-TNF inhibitors, IL-17 inhibitors, IL-12, TYK 2 inhibitors, and other medications becoming integral to a patient’s psoriasis treatment regimen [1,2]. However, given the ubiquitous use of biologics in psoriasis management, the response to these medications is not homogenous, with differences in patient genomics contributing to nearly 70% of the inter-individual drug response differences [2]. Pharmacogenetics provides dermatologists with more targeted treatment modalities to illicit the best response in psoriasis patients with minimal adverse effects. Given the costly nature of biologic medications, identifying the optimal drug for each patient may reduce annual healthcare expenditures.

Biologic treatment for psoriasis is largely a “trial-and-error” process with most dermatologists changing the biologic agents for 10-30% of their patients in the first year and an intra-class switch of at least 50% of treatment-nonresponsive patients [3]. A retrospective claims analysis indicated that 46% of psoriasis patients discontinued their biologic within 12 months and only 38% of patients were adherent to treatment [4]. Adherence to clinical guidelines such as the Clinical Pharmacogenetics Implementation Consortium (CPIC) regarding drug-gene interactions which may guide individual drug-dose therapy including making dose adjustments, identifying efficacious medications, and monitoring drug events. Genomic datasets are being developed that allow dermatologists to search for cell lines of interest and evaluate genotype data to predict dose-response data for various biologics (Table 1). These datasets along with pharmacogenetic testing can be utilized by physicians to aid in optimal biologic agent selection to minimize the “trial and error” process and associated costs. Additionally, other machine learning based
tests, use dermal biomarker patches to collect patient RNA and predict therapeutic response to commonly used psoriasis agents. Community dermatologists view pharmacogenetic testing applications favorably; 93% of respondents would use this technology to determine first line therapy even if it differed from initial choice. All the survey respondents stated that they would use such services if it was part of the prior authorization process and 98% stated that it would improve patient outcomes [3].

Various clinical trials are underway to evaluate the utility of genomic databases in guiding agent selection. Although pharmacogenetics is a useful tool in predicting a patient’s response, environmental factors (epigenetics) and polygenic considerations may complicate predicting individual-drug responses [5]. Additionally, formularies may impact a physician’s agent selection as their preferred agent may not align with formulary constrictions. Future studies should aim at identifying pharmacogenetic parameters and predictive biomarkers in larger cohort studies. In dermatology, precision medicine may personalize patient treatment regimens, reduce healthcare costs, and minimize adverse effects through ensuring optimal agent selection.

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**Abbreviations:** Pharm GKB: Pharmacogenomics Knowledgebase; CPIC: Clinical Pharmacogenetics Implementation Consortium; Pharmaco DB: Pharmaco-database; OMIM: Online Mendelian Inheritance in Men; GARD: Genetic and Rare Diseases; PACdb: Pharmacogenomics and Cell Database; CYP450: Cytochrome P450; SNPs: Single Nucleotide polymorphisms.

**References**


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