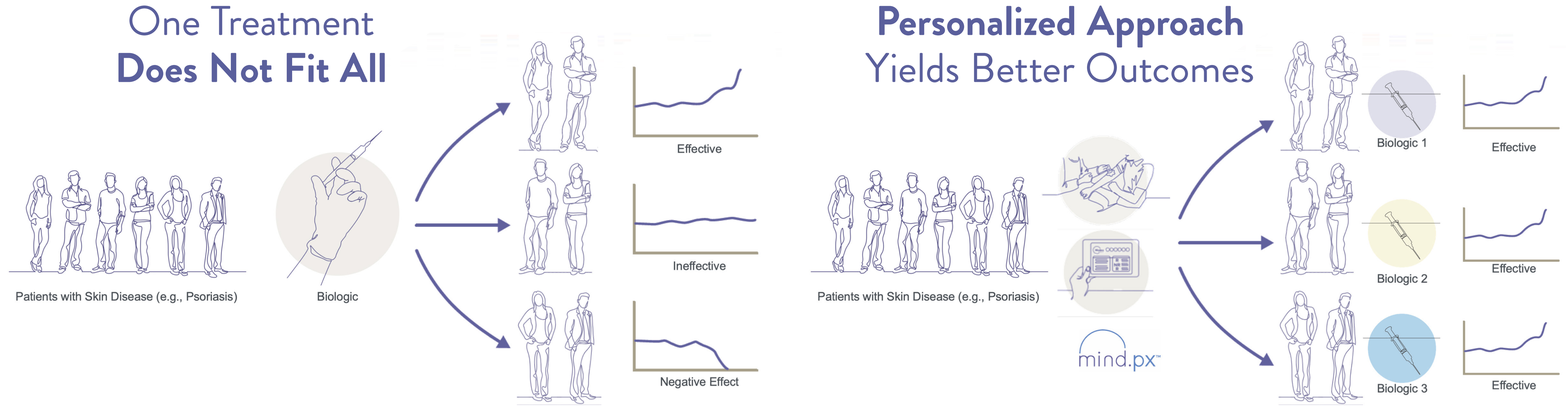
MIND.PX

PERSONALIZED MEDICINE FOR PSORIASIS BIOLOGIC TREATMENT

Tobin J. Dickerson, PhD*, Byung-In Lee, PhD, Paul Montgomery III, MS, Stephen Boyd, BS, Eric Andrade, BS, Christian Abaya, BS, Courtney Boyce, BS, Tatiana Tomich, MPH, and Yipeng Wang, MD, PhD
Mindera Health, 5795 Kearny Villa Road, San Diego, CA 92123

SYNOPSIS In the United States, psoriasis affects upward of 3% of the population, leading to healthcare costs of >$110 billion annually. The emergence of targeted biologic treatments has revolutionized the management of moderate to severe psoriasis patients, with impressive results. However, these clinical gains have come with a concomitant dramatic increase in the spending on higher priced biologic drugs. A personalized approach allows clinicians to prescribe the best medication, the first time. Patient outcomes quickly improve, without incurring the excess cost associated with a trial-and-error approach.



OBJECTIVE

To develop and validate a machine learning-based classifier that can predict if a psoriasis patient will respond to a specific biologic drug class prior to drug exposure.

METHODS

Transcriptomes were collected from subjects (N=232) with a psoriasis diagnosis using a proprietary Dermal Biomarker Patch kit (Figure 1A) that allows simple, rapid, and painless extraction of RNA from the skin (Figure 1B). Patient PASI scores were measured at baseline as well as weeks 12 and 16 after drug exposure. Transcriptomes were analyzed using next-generation sequencing (NGS) following standard protocols. The resulting data set (transcriptomic data and clinical outcomes) was used to train and prospectively validate a machine learning-based classifier for each class of biologic (TNFαi, IL-17i, IL-23i).

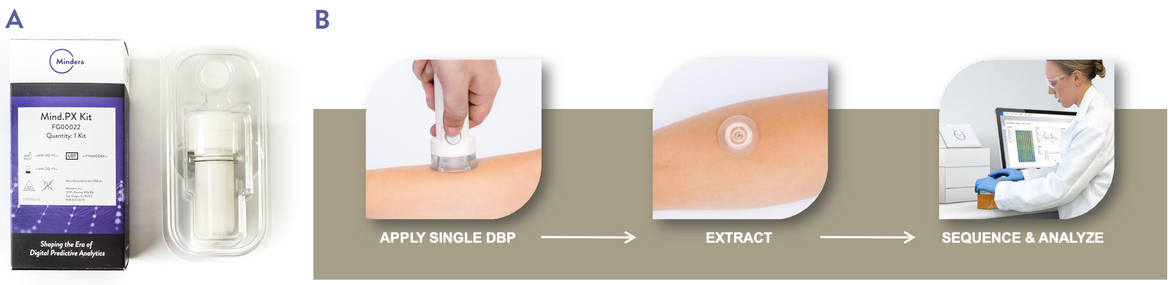


FIGURE 1. (A) Mind.Px kit. (B) Dermal Biomarker Patch workflow.

RESULTS

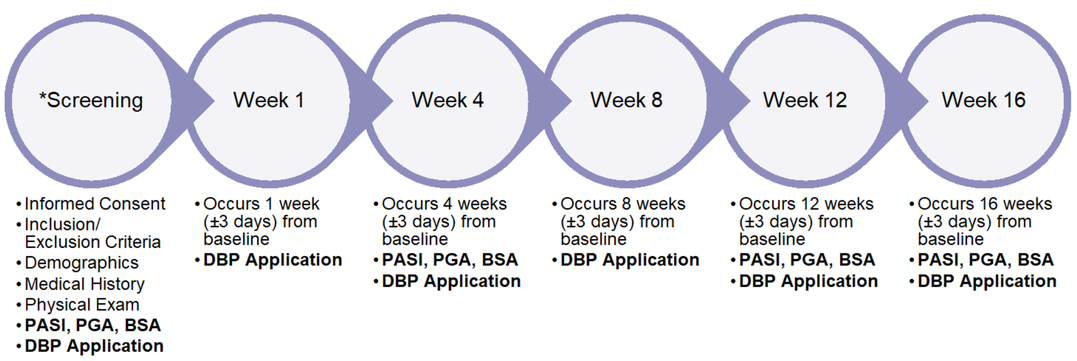
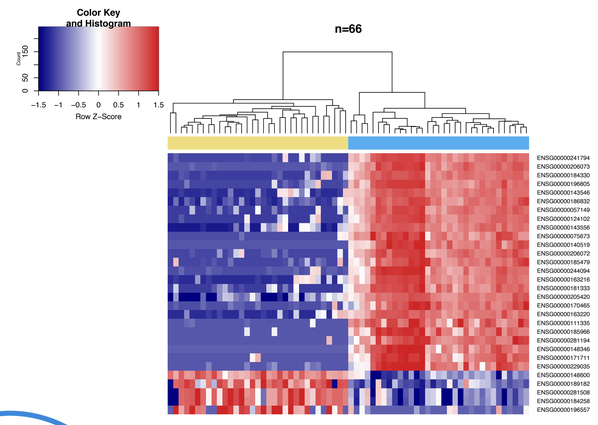
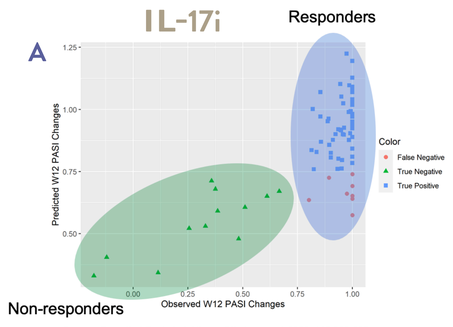


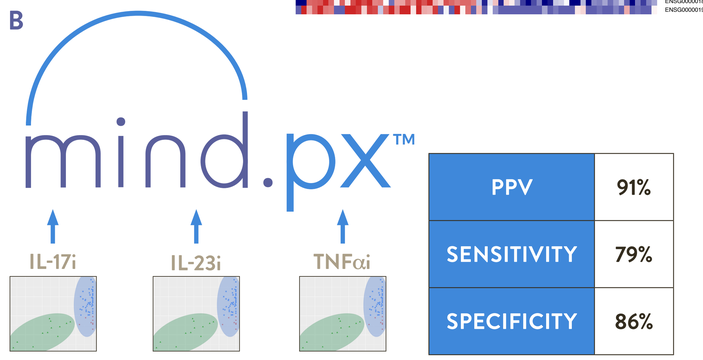
FIGURE 2. STAMP trial design. All enrolled subjects were not actively treated with topical medication on the study lesion and had not been dosed with any systemic medication for their psoriasis for at least 2 weeks.

FIGURE 3. Preliminary evaluation of the psoriatic transcriptome obtained using the Mind.Px kit. In this data set (N=66), patient lesional and non-lesional transcriptomes were compared to confirm the analytical validity of the Mind.Px kit. On average, transcriptomes of >7,000 transcripts were obtained, of which ~1,500 transcripts were differentially regulated in lesional skin. Unsupervised clustering of the highest variance genes showed tremendous separation between lesional and non-lesional skin.





PPV	BALANCED ACCURACY
>90%	>93%



PPV	91%
SENSITIVITY	79%
SPECIFICITY	86%

FIGURE 4. (A) IL-17i classifier development. Using a machine learning method that combines baseline transcriptome data with clinical outcomes as defined by W12 PASI, we have validated a classifier that predicts patient response to IL-17i biologics with high positive predictive value and high accuracy. (B) Combining individual classifiers for each of the three biologic classes (N=232 patients) yields the Mind.Px machine learning-based algorithm that predicts patient response to all biologic drug classes with high-positive predictive value (91%), sensitivity (79%), and specificity (86%).

CONCLUSION

INTELLIGENTLY, CONFIDENTLY CHOOSE PSORIASIS BIOLOGIC

By combining Mindera Health Dermal Biomarker Patch technology with machine learning methods, we developed a precision medicine test (Mind.Px) that can:

- accurately predict psoriasis-patient response to biologic class (TNFαi, IL-17i, or IL-23i) prior to drug exposure
- prescribe patients the right biologic the first time, for improved outcomes and tremendous cost-savings
- minimize the trial-and-error approach to psoriasis treatment

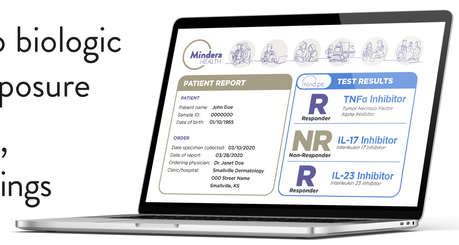


FIGURE 5. Sample Mind.Px test report showing patient response to TNFαi, IL-17i, and IL-23i biologics.

Funding for this project was provided by Mindera Health.