OBJECTIVE
To demonstrate the ability of the Mindera Health DBP to extract actionable quantities of mRNA from lesional skin of psoriasis patients, and explore the body-site dependence of this method.

METHODS
Using the DBP, a total of 416 transcriptomes were collected from 24 different body areas; each transcriptome was comprised of ~7,000 biomarkers. Samples were collected from research sites (N=15) under an IRB-approved protocol. After collection, samples were placed in a storage buffer between 2–8˚C for transport and processing.

Once received, next generation sequencing (NGS) was performed according to standard procedures. Measurements were made of the gene detection rate and mRNA yield. Additionally, a subset of samples was analyzed at various time points after sample collection (1-10 days) to determine mRNA stability during storage and transport.

RESULTS
FIGURE 3. Gene detection rates from various body sites (N = 416). The gene detection rate ranged from 1.1% to 76.2%. The average gene detection rate was 43.3%. Based on a ≥20% gene detection rate acceptance criterion, >96% of the samples passed quality control metrics. Statistical analysis of the data set demonstrated no statistically significant difference observed between body sites (ANOVA, p=0.342), in contrast to previously published data using stratum corneum tape stripping.

FIGURE 4. Yield of mRNA extracted from DBPs (N=412). The acceptance level for minimum concentration was determined to be 2-5 ng of amplified RNA at a concentration of 0.2 ng/µL. The yields of amplified mRNA ranged from 12–2,240 ng with an average yield of 360 ng, >100-times larger than the published average yields from stratum corneum tape stripping. All samples passed the acceptance criterion of >4 ng and yielded acceptable results in downstream sequencing.

FIGURE 5. Influence of time between collection and processing on quality of DBP RNA-Seq data. A subset of 373 psoriasis skin samples was collected from research sites, stored in storage buffer at 2–8˚C, and transported in an insulated shipper system at 2–8˚C overnight for downstream analysis. To substantiate mRNA stability, the gene detection rates were determined for samples stored from 1 day to 10+ days. A total of 94.7% of the samples exceeded the QC threshold of 20% gene detection.

SYNOPSIS
The Dermal Biomarker Patch (DBP) platform efficiently captures transcriptomes of >7,000 biomarkers from the lesional skin of psoriasis patients in sufficient quantities for next-generation sequencing protocols. There was no significant body-site variation observed, in contrast to stratum corneum tape stripping. This platform makes precision medicine in dermatology a reality. It provides a powerful tool for doctors, researchers, and patients to better understand the skin.

CONCLUSION
The Mindera Health Dermal Biomarker Patch platform has been proven to reliably extract the skin transcriptome in a minimally invasive manner. Success in psoriasis patients includes:

- highly reproducible efficiency of extraction
- excellent mRNA yields suitable for RNA-Seq protocols
- >96% of samples passing quality control metrics
- no body-site bias in transcriptome extraction

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