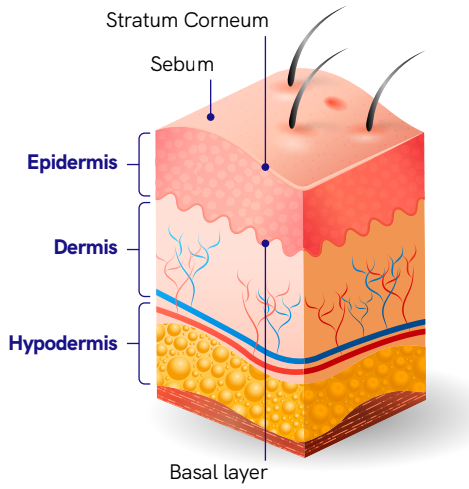
Noninvasive Skin Tapes

Measure biomarkers for dermatology and microbiome to understand skin biology



Sebum: lipid-rich secretion of sebaceous cells on the outmost layer of skin; understand acne, seborrheic dermatitis, oily skin, and lipid biomarkers for drug development

Stratum Corneum: Topmost layers of epidermis; measure microbiome signatures, proteins, metabolites, and unique lipids to profile dermatologic conditions and skin health

NON-INVASIVE
Identify and measure *in situ* biomarkers without a blood draw

PROSPECTIVE COLLECTION
Define your I/E criteria
Concurrently collect other sample types

RECALLABLE DONORS
Events-based or longitudinal trial design

PATIENT-CENTRIC
Samples collected in-home for ease and comfort

HLA typing

Clinical annotation

Biomarker characterization

Questionnaires

Skin tapes collected in patient's home

Optionally collect blood, stool, urine, other samples

Temperature-controlled, overnight delivery to Sanguine Lab for storage

Prospectively collect once or multiple time points

Skin is the largest organ in the body, protecting against environmental insults and sensing external stimuli. A complex, layered community of epithelial and immune cells with diverse roles; cross-functional lipids, biochemicals, and proteins; as well as resident microbiota and opportunistic pathogens, our skin is the conduit for how we measure and project ourselves to the world.

Dermatological sampling no longer requires invasive biopsies and punches. Rather, skin taping technologies allow for sebum and stratum corneum collection of skin cells, biomarkers and microbe signatures that inform on disease pathogenesis, therapy safety and efficacy, microbiome function, and cosmetic impact on skin health.[1] Noninvasive skin sampling can also be simultaneously collected alongside other biospecimens, such as serum or PBMCs, to provide systemic biomarker relationships.[2]

Use Skin Tapes for:

Dermatology
Viable alternative to biopsies and punches for discerning diseases like psoriasis and atopic dermatitis

Drug Development
Non-invasive biomarkers for target engagement, MoA, safety, metabolism

Skin Microbiome
Metagenomics, 16S RNA sequencing, metabolomics, transcriptomics, proteomics

Skin Biology
In situ biomarkers for cancer, immunity & inflammation, skin barrier, redox, circadian dynamics

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Skin Tape Case Studies:

Noninvasive stratum corneum tapes reveal similar biology as skin biopsies in healthy & atopic dermatitis[1]

Challenge
Invasive biopsies dissuade trial participants, limiting and biasing disease pathogenesis & therapy research.

Experiment
Stratum corneum from healthy, atopic dermatitis (AD) lesion, and AD non-lesion skin (n=6 each group) was collected using tape discs and 2-mm biopsies.

D-Squame expression	Biopsy expression	Corr. P-value
FLG gene	FLG gene	0.005
FLG gene	FLG protein	0.002
CDSN gene	CDSN gene	0.0002
CDSN gene	CDSN protein	0.0007

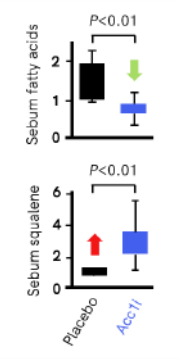
Insight
Tape discs noninvasively reach the upper epidermal granular layer.

Gene expression levels for surface proteins filaggrin (FLG), corneodesmosin (CDSN) and others on tape discs reliably correlated with biopsy gene and protein levels for both healthy and AD skin.

Sebum measurements shed light on acne pathogenesis and reveal potential therapy[2]

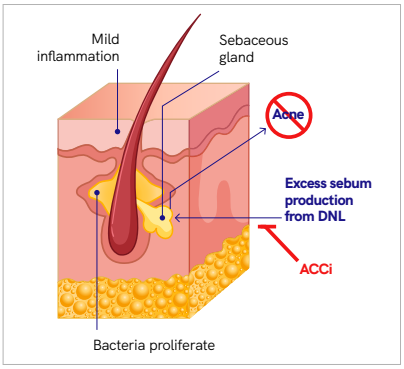
Challenge
A hallmark of acne is the overproduction of sebum lipids on the skin surface.

Experiment
Sebum and serum lipidomics reveal that de novo lipogenesis (DNL) responsible for ~80% of sebum lipids.



Insight
DNL inhibitor (ACC1i) significantly reduces sebum lipid levels *in vivo*, but not DNL-independent and beneficial lipids like squalene.

Blocking DNL via ACC inhibition represents a selective and effective mechanism for reducing acne.



Indications	▪ Psoriasis ▪ Atopic Dermatitis ▪ Melanoma ▪ Acne Vulgaris ▪ Sjrogen's Syndrome ▪ Cutaneous Lupus Erythematosus ▪ Allopecia ▪ Rosacea ▪ Healthy controls
Use	Research Use Only (RUO)
Collection Methods	▪ Stratum corneum tape discs ▪ Sebum tapes ▪ Skin swabs
Temperature, storage, and shipment	Custom
Concurrent, in-home sample collection	▪ Serum/Plasma ▪ Whole blood ▪ PBMCs ▪ Urine ▪ Stool ▪ Hair, Nails ▪ Saliva ▪ Other

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[1]Kim et al. (2019) Side-by-side comparison of skin biopsies and skin tape stripping highlights abnormal stratum corneum in atopic dermatitis. *J Invest Dermatol.* 139(11): 2387-2389.e1.

[2]Esler et al. (2019) Human sebum requires de novo lipogenesis, which is increased in acne vulgaris and suppressed by acetyl-CoA carboxylase inhibition. *Science Transl Med.* 11(492): eaau8465.

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