Future-Proofing the Skin

Transcriptomic Insights & Advanced Testing Models for Preventive Skincare

16.04.2026

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From Repair to Prevention

Why are we waiting for damage to show up?

OLD ERA (TRADITIONAL SKINCARE)

Focus on measuring visible endpoints and **phenotypic** damage

NEW ERA (NEXT-GEN SKINCARE)

Focus on measuring cellular **resilience** before the phenotype appears

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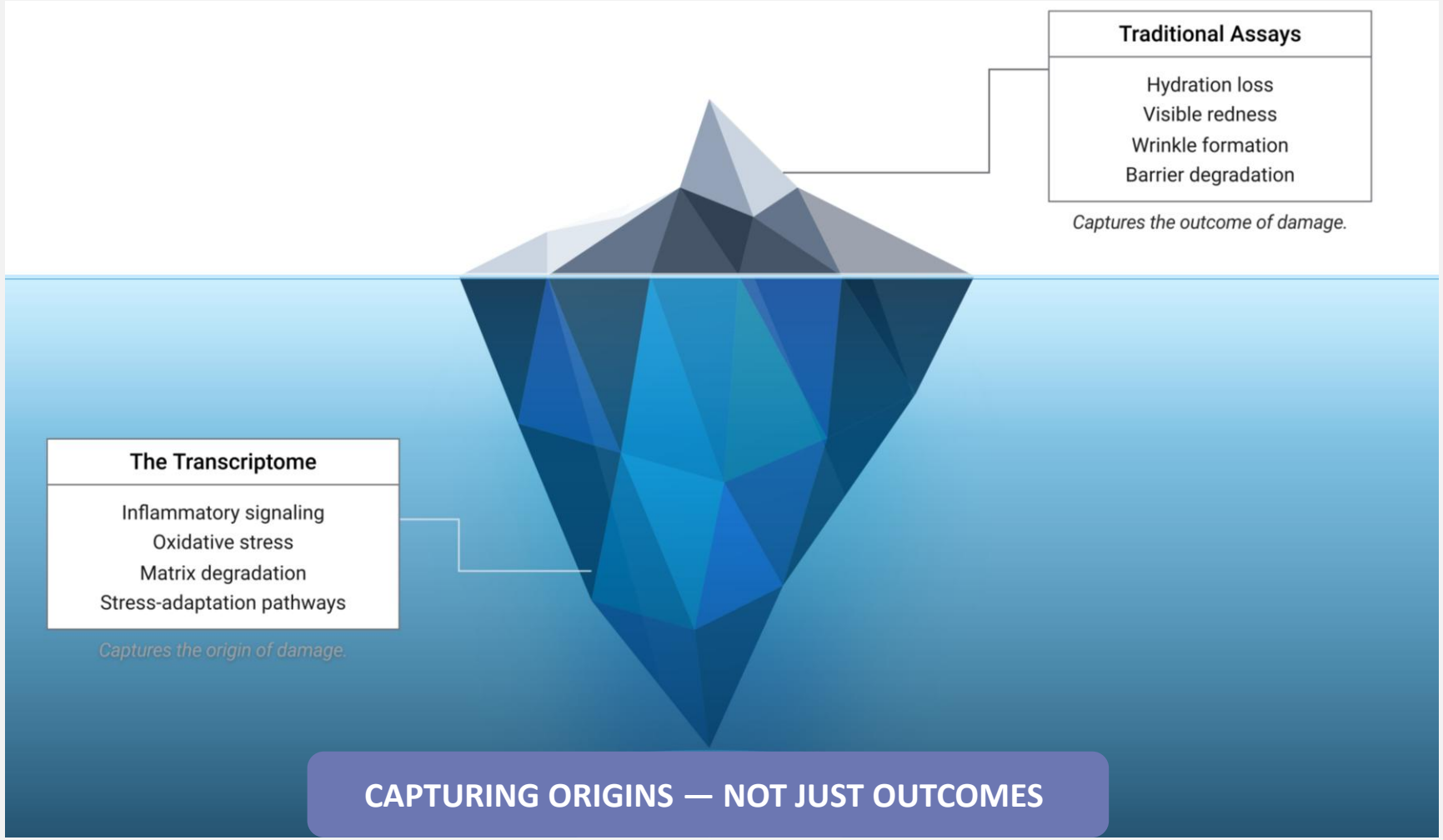
Unmasking the True Root of Skin Damage

What Traditional Assays Miss Below the Surface.



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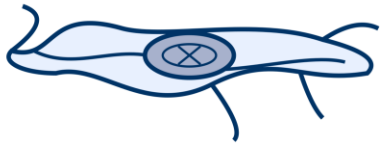
Listening To Your Cells in Real Time

DNA: What the cell could do | *RNA: What the cell is doing*

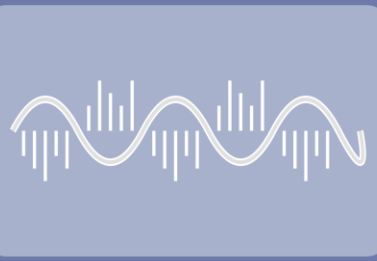


Cell

All cells contain the same foundational DNA.

DNA

Only specific genes are active at any given time.



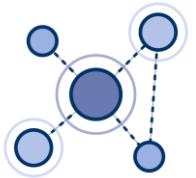
mRNA

Carries the immediate message from the active genes.

Transcriptomics

Protein

mRNAs are successfully translated into functional proteins.



Function

- ✓ Repair
- ✓ Metabolism
- ✓ Signaling
- ✓ Inflammation

Transcriptomics measures RNA to reveal **which genes are active** and how cells are responding at a given moment.

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How Do We Turn Biology into Product Stories?

FROM VISIBLE EFFECTS –

TO EXPLAINING THE BIOLOGY

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Skin Barrier and Hydration

1. THE MARKETING QUESTION

"Does my cream/serum really strengthen the skin barrier and improve hydration?"

2. THE TRANSCRIPTOMIC PROOF

- Up-regulation of barrier genes (e.g. filaggrin, claudins)
- Activation of lipid & ceramide synthesis pathways
- Increased expression of water transport genes (e.g. aquaporins)

3. THE NEW SCIENTIFIC CLAIM

"Your product does not just hydrate on the surface, it increases expression of key barrier and hydration genes, showing a deeper biological effect."

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Redness and Inflammation

1. THE MARKETING QUESTION

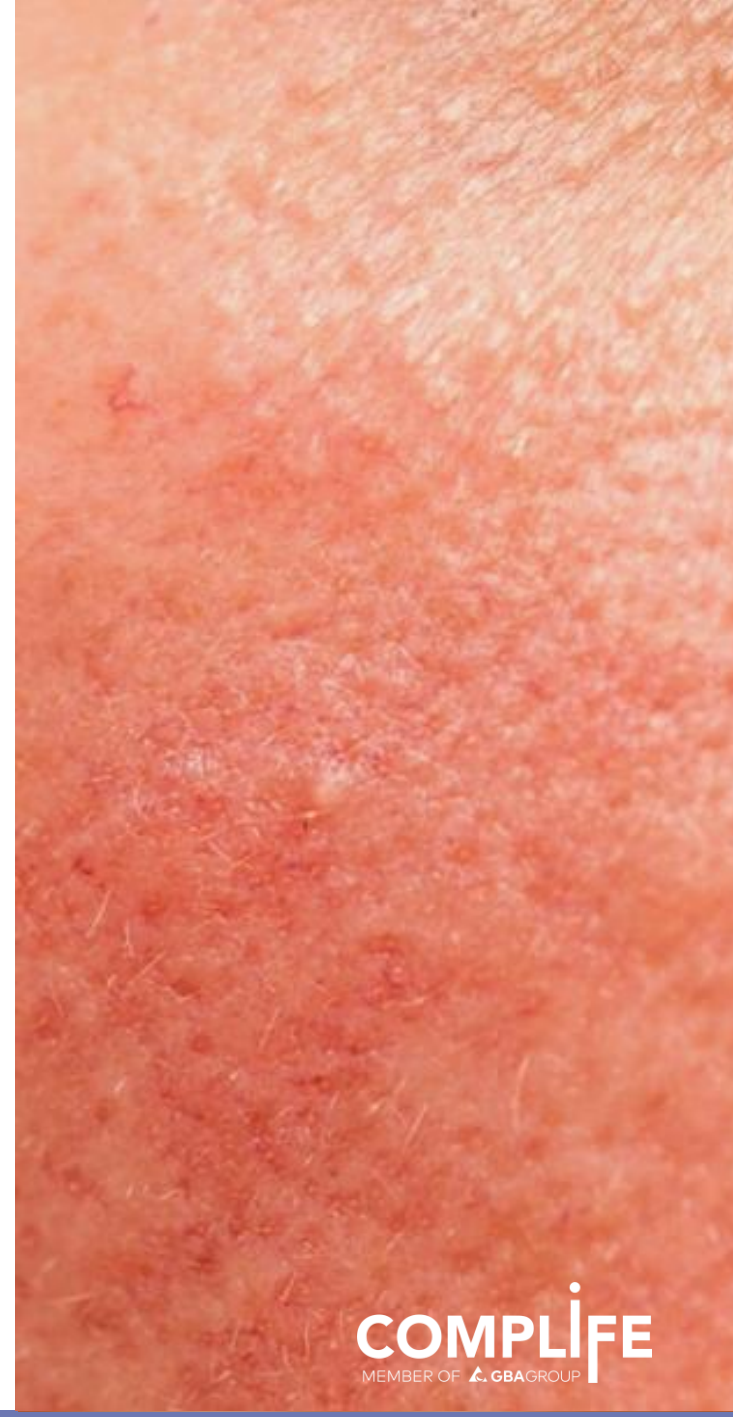
"Does my product actively calm sensitive or irritated skin?"

2. THE TRANSCRIPTOMIC PROOF

- Decrease of pro-inflammatory cytokine genes
- Reduced activation of innate immune pathways
- Up-regulation of soothing and resolution markers

3. THE NEW SCIENTIFIC CLAIM

"After 4 weeks, we see a clear down-regulation of inflammation-related genes in treated skin compared to placebo."



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Anti-Aging & Firmness

1. THE MARKETING QUESTION

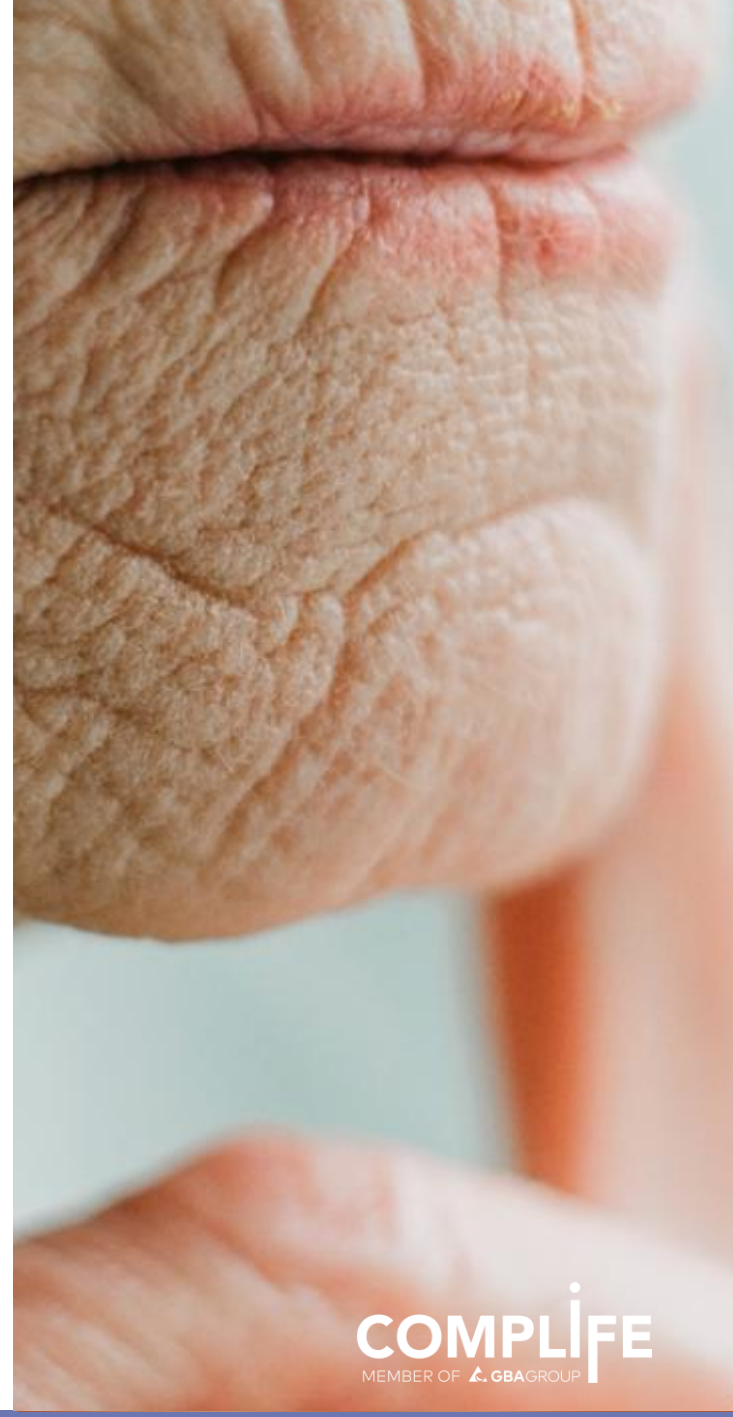
"Can we prove my anti-aging formula does more than just hydrate?"

2. THE TRANSCRIPTOMIC PROOF

- Changes in collagen, elastin & ECM synthesis genes
- Reduction of matrix-degrading enzymes (e.g. MMPs)
- Activation of repair & cell longevity pathways

3. THE NEW SCIENTIFIC CLAIM

"The transcriptomic profile is consistent with improved extracellular matrix maintenance and reduced collagen degradation."



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Enviro-Protection

1. THE MARKETING QUESTION

"Can we show protection against pollution, UV, or blue light?"

2. THE TRANSCRIPTOMIC PROOF

- Up-regulation of antioxidant & detox pathways
- Modulation of DNA damage & stress-response signatures
- Reduced expression of stress markers vs. controls

3. THE NEW SCIENTIFIC CLAIM

"We can demonstrate that your product activates the skin's own detox and antioxidant defense at the gene level."

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Active Ingredient MOA

1. THE MARKETING QUESTION

"How does this new active work? What is its unique 'fingerprint'?"

2. THE TRANSCRIPTOMIC PROOF

- Global pathway analysis (e.g. lipid metabolism, stress response)
- Distinct "molecular signature" vs. placebo or benchmark
- Dose-response gene signature changes mapping

3. THE NEW SCIENTIFIC CLAIM

"This ingredient has a unique transcriptomic fingerprint, clearly distinct from standard niacinamide, vitamin C, or other benchmarks."

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Scalp & Hair Care

1. THE MARKETING QUESTION

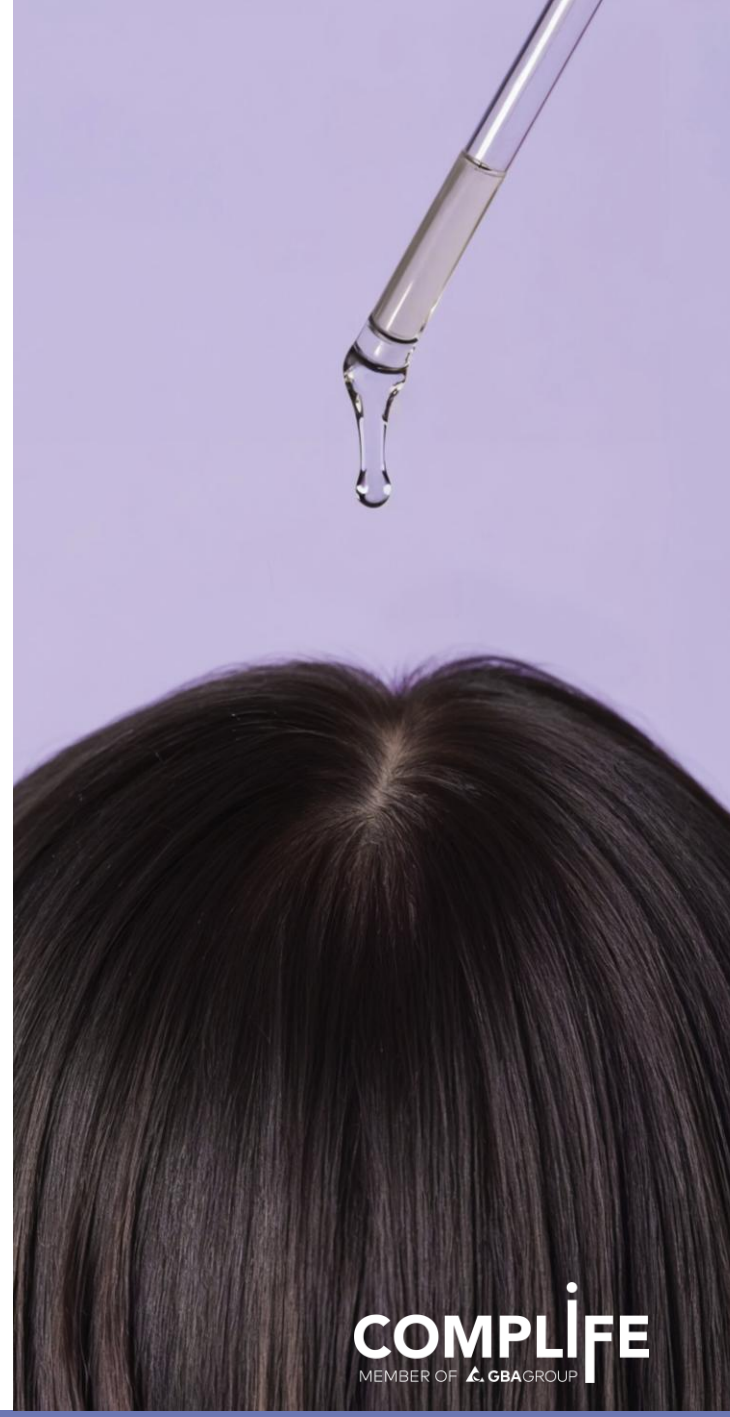
"Can we support claims for anti-dandruff, anti-hair loss, or scalp soothing?"

2. THE TRANSCRIPTOMIC PROOF

- Modulation of inflammatory/barrier genes in scalp skin
- Changes in hair cycle-related transcripts (growth vs. rest)
- Host response combined with microbiome readouts

3. THE NEW SCIENTIFIC CLAIM

"The product reduces expression of inflammation-related genes and normalizes scalp barrier and defense pathways."



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“Clean” & Tolerance

1. THE MARKETING QUESTION

"Can we show our formula is effective but not aggressive?"

2. THE TRANSCRIPTOMIC PROOF

- Absence of strong stress or damage gene signatures
- No activation of irritation or allergic response pathways
- Comparison to a more aggressive benchmark (e.g. retinoid)

3. THE NEW SCIENTIFIC CLAIM

"Compared to the benchmark, your formula achieves the desired biological effect with a much lower irritation gene signature."

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The Two-Part Framework

What makes this useful is not only the technology itself, but the **strategic methodology** built around it.

Route 1

The Raw Ingredient

Method:
In Vitro Stress Models

Goal:
Mechanism Discovery & Claim Direction

Route 2

The Finished Product

Method:
In Vivo, Non-Invasive Sampling in Volunteers

Goal:
Real-World Clinical Validation

A discovery-first workflow in the lab, and a non-invasive verification in the clinic.

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Route 1: In Vitro

THE RAW INGREDIENT

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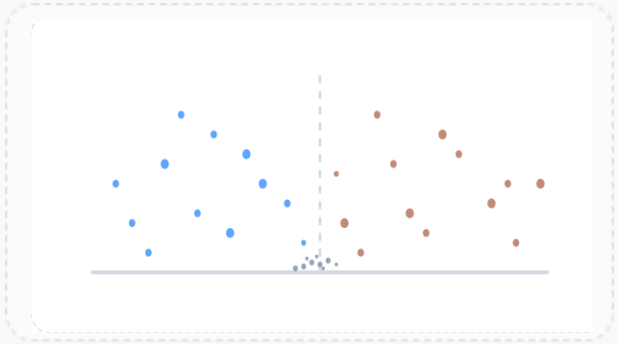
The Model That Proves the Platform

Visualizing the shift from massive genomic disruption to targeted molecular defense.

UV STRESS

3,000

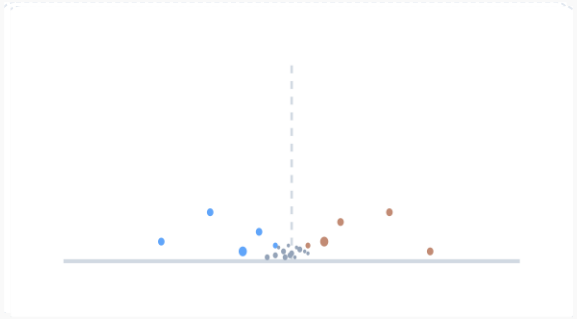
GENES ALTERED



TREATMENT VS. UV

71

GENES CHANGED



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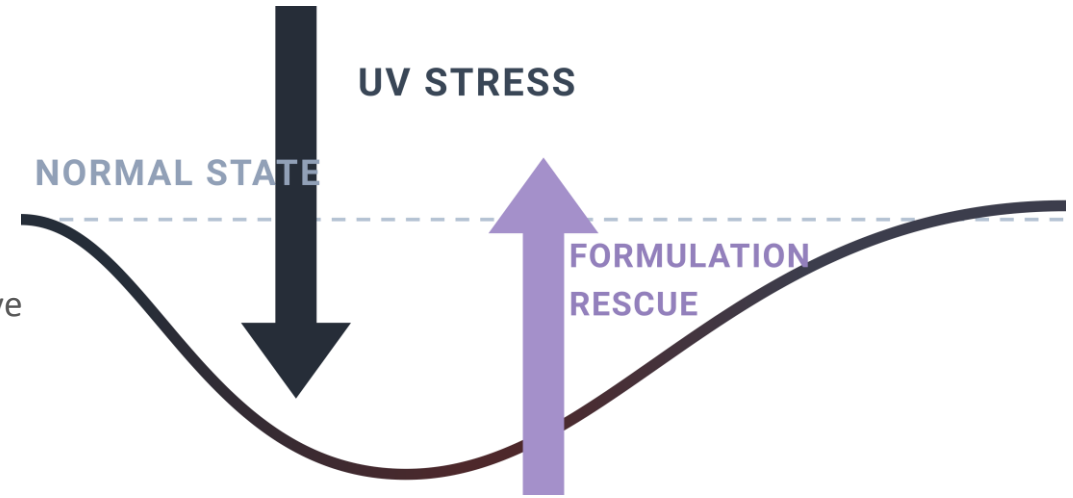
Providing Biological Rescue

Transcriptomics provides indisputable, empirical proof of **corrective formulation activity** at the deepest genomic level.

65%

Rescue Behavior

65% of the treatment-responsive genes moved in the exact opposite direction of the UV insult.



From Cellular Damage to Formulated Recovery

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Route 2: In Vivo

THE FINISHED PRODUCT

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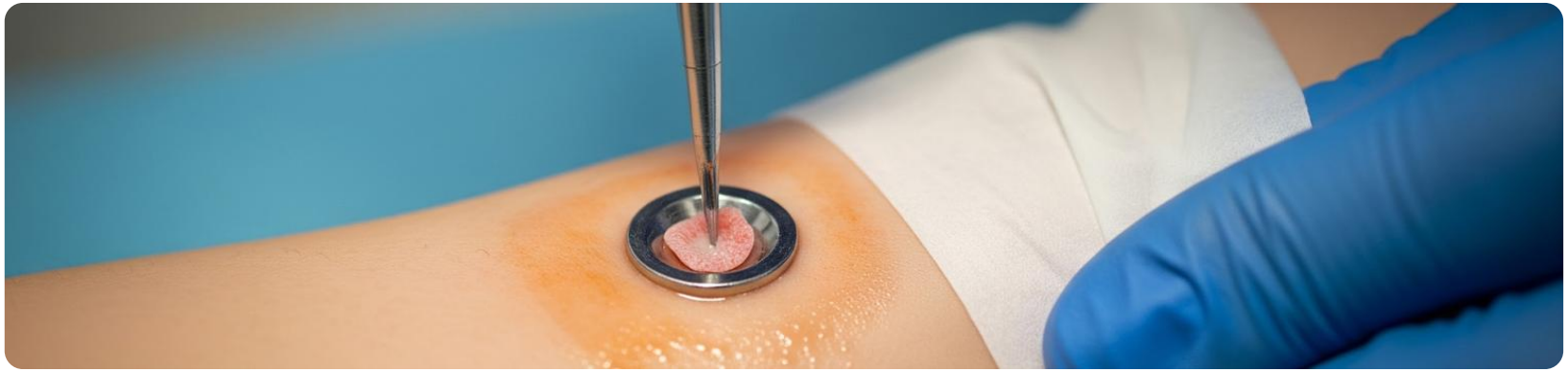
The Problem with the Obvious Solution

Invasive biopsies create critical barriers for large-scale cosmetic trials.



LIMITATION 1

SEVERE SUBJECT ATTRITION

High pain and scarring lead to unacceptable drop-out rates in longitudinal cosmetic studies.

LIMITATION 2

COMMERCIAL IMPRACTICALITY

High costs, need for anesthesia, and low throughput make large-scale consumer trials prohibitive.

LIMITATION 3

PRE-CLINICAL BLINDSPOT

Captures deep structural damage, but often misses subtle, early-stage pre-inflammatory signatures in the epidermis.

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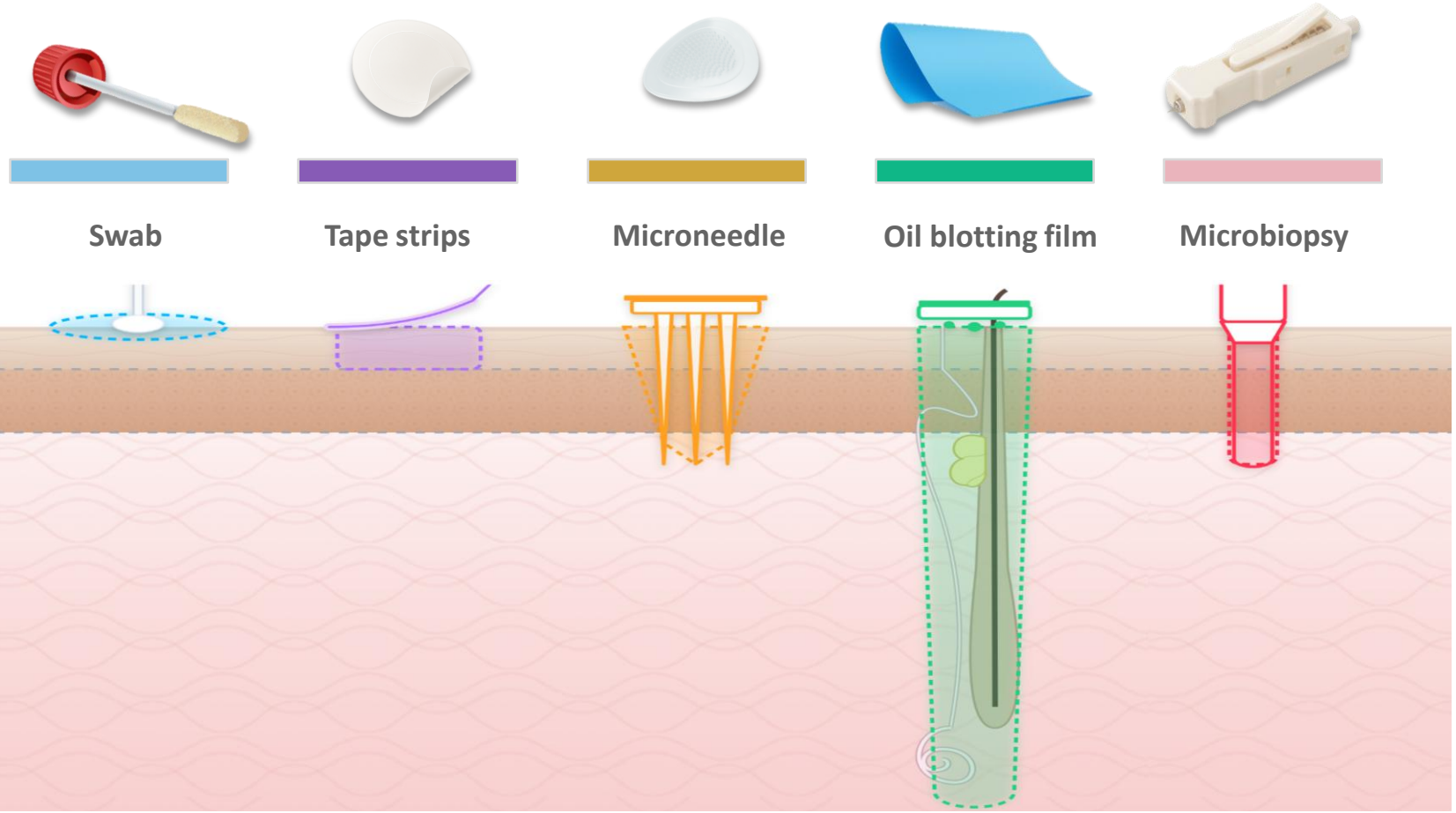
Sampling defines the Signal



1. Design: Whitin-subject (n=3); matched facial sites; randomized device order.

2. QC: Cutting-edge Nanodrop/Qubit & TapeStation (RINe, DV200, rRNA peaks)

3. Sequencing: ONT full-length 16S library prep.

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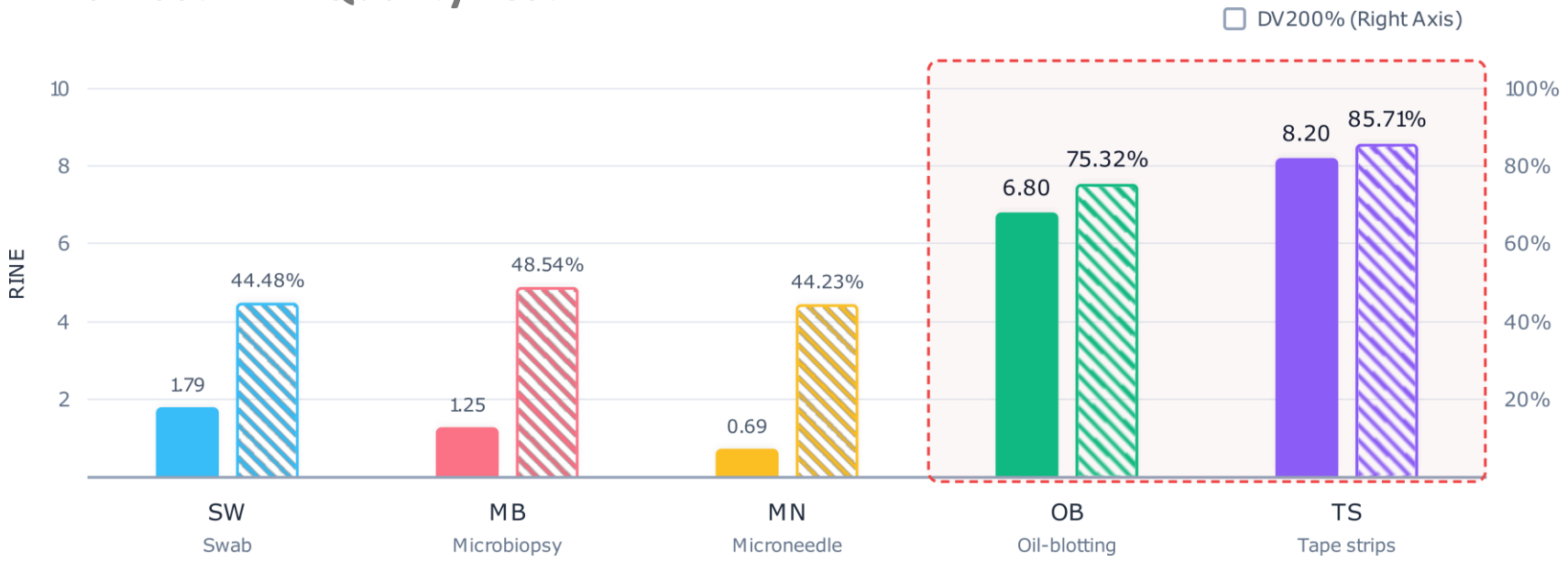
Can Non-Invasive Sampling Really Support Transcriptomics?

RNA Is Fragile, So Sampling Quality Matters

The Host RNA Quality Test



Tape Strips and Oil blotting:
The highest eukaryotic RNA integrity

Oil blotting
Exceptional 16S/23S rRNA peaks

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Thank you! Please do not hesitate to contact us.

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