



# IMPROVING THERAPEUTICS AND SKIN CARE WITH METABOLOMICS

The architecture of our skin is complex, with each layer possessing a unique composition and function which provides for a first line of defense against environmental, physical and chemical assaults. However, cellular damage and aging can perturb these functions through changes in amino acid, lipid and energy metabolism across the various skin layers.<sup>1</sup> Assessing the role metabolites play in these pathways can provide a powerful tool to unlocking the underlying mechanisms driving skin-related diseases and conditions.

## SIMPLIFYING COMPLEXITY OF SKIN BIOLOGY WITH METABOLOMICS

Metabolomics, or biochemical profiling of fluids or tissues, is uniquely suited to explore the relationship between skin health, disease, external stress factors, and response to intervention.<sup>2</sup> This powerful approach can enable improved development of effective therapeutics, as well as beauty and skin care products.

### Product Development

- Reduce development time and improve product efficacy by elucidating metabolic targets of various skin conditions
- Drive clinical innovation via predictive biomarkers
- Assess stability and bioavailability of bioactives
- Establish/support claims
- Application areas include skin barrier function, photo-aging, wound healing, hair care and oral health

### Ingredient/Drug Development

- Clarify method of action
- Enhance patient stratification
- Improve biomarker identification
- Demonstrate safety of the functional component
- Advance R&D pipeline in therapeutic areas such as acne, psoriasis and atopic dermatitis

### Basic Research

- Characterize metabolic profiles across a wide variety of skin conditions
- Interrogate the role of microbiome in skin health

### SKIN BIOCHEMISTRY IS ALTERED WITH AGE AND DAMAGE

- Changes in proteins due to chemical, environmental, and biological stresses
- Changes in essential, free amino acids
- Alterations in lipid profiles
- Changes in osmotic and oxidative stress markers
- Modifications in energy markers and vitamins
- Altered ratios of amino acids and endogenous metabolites
- Age-related changes in the skin barrier function



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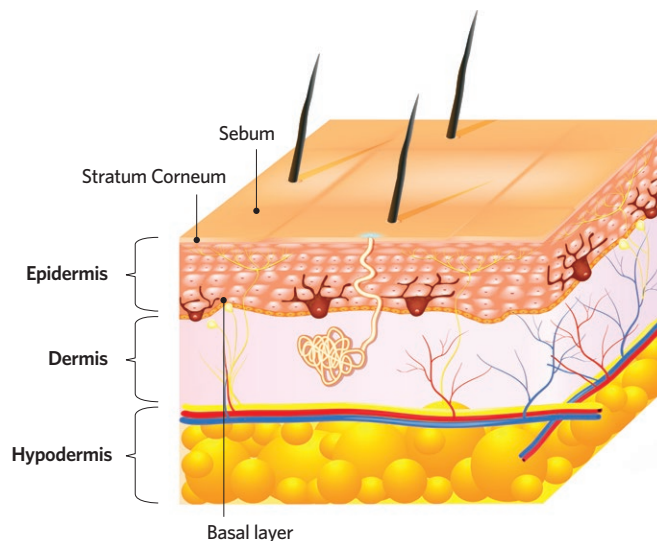
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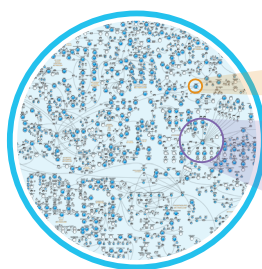
# METABOLOMICS: SCIENCE THAT IS MORE THAN SKIN DEEP

Metabolon has experience with a wide number of sample types and models with a range of experimental aims. We will consult with you to understand your goals and provide guidance on appropriate study design.



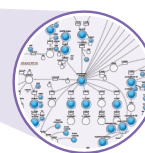
Sample Matrix	Method	Related Panels	Research Benefit
Sebum	Sebutape, Swabs	HD4 Global Platform Sebum Lipid Panel	Quantify complex lipids in sebum to identify compositional changes associated with conditions such as acne, oily skin and seborrheic dermatitis.
Stratum Corneum	D-Squame discs	HD4 Global Platform Stratum Corneum Lipid Panel	Assess the metabolic signature of stratum corneum in response to the impact of age, UV damage or topical therapeutics.
Tissue Biopsy	4mm punch biopsy	HD4 Global Panel Complex Lipid Panel	Gain mechanistic insights into biochemical changes related to inflammation, barrier function or collagen structure of skin.
Culture	Cell Pellet/Media Reconstructive Skin	HD4 Global Panel Complex Lipid Panel	Investigate metabolic impact, mode of action, or efficacy of treatment.

## METABOLON METABOLOMICS PLATFORMS: A NEW TOOL IN YOUR RESEARCH PROGRAMS



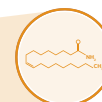
### GLOBAL METABOLOMICS

Cast a wide research net with our global metabolomics technology (Up to 1,000 metabolites/sample).



### LIPIDOMICS

Deploy a uniquely insightful lipidomic approach that comprehensively quantitates lipid species (up to 1,100 lipids/sample).



### TARGETED METABOLITE ASSAYS

Narrow your focus to specific pathways, themes or metabolites with custom or pre-developed assays (~1-160 metabolites/assay).

## References

<sup>1</sup>Randhawa M, Sangar V, Tucker-Samaras S, Southall M (2014) Metabolic Signature of Sun Exposed Skin Suggests Catabolic Pathway Overweighs Anabolic Pathway. *PLoS ONE* 9(3): e90367.

<sup>2</sup>Lawton, K.A., et al., Analysis of the adult human plasma metabolome. *Pharmacogenomics*. (2008). 9(4): p. 383-97.



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