

Gene expression  
screening to identify  
activation profiles in skin  
after exposition to  
cosmetic ingredients

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for Alternative Methods

# Evolution of Biological Models for Skin Research

Skin models have gradually become more complex and presented features closer to human skin in their natural state...

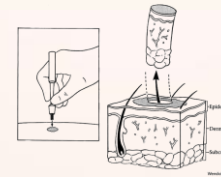
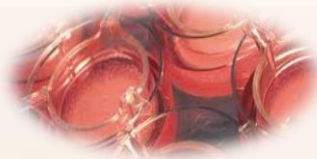
Monolayer cell culture and co-cultures

Skin equivalent (3D)

SKIN EXPLANTS

Skin biopsy

Structural complexity  
Closer to real



...allowing us to evaluate the safety and effectiveness of active ingredients and formulations.

TOPICAL APPLICATION OF NON-SOLUBLE INGREDIENTS

**Lipid-based ingredients**  
**Cosmetic formulations**

# Evolution of biomolecular tools for skin research

## *Traditional techniques*

1 ingredient each time

1 specific mechanism

## *Large-scale approaches*

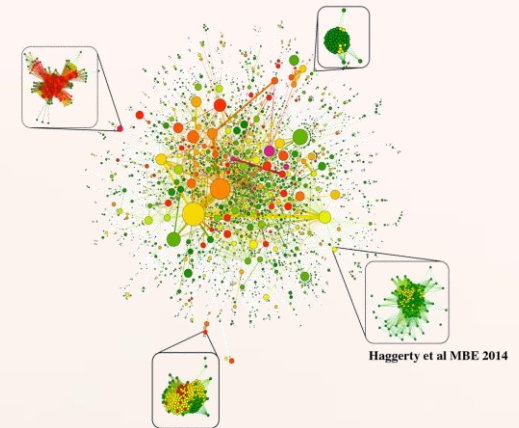
### OMICs

Hundreds of different mechanisms at the same time

Reduction of cost for sample

Reduction of time of research

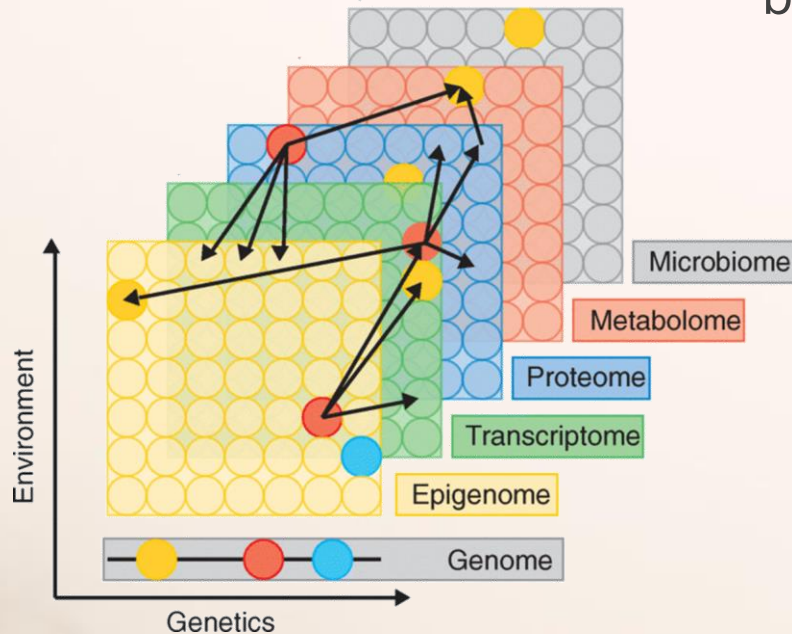
...driving productivity in research into the discoveries of new biological activities



# OMICs technologies

Comprehensive approaches for analysis of complete genetic or molecular profiles

Currently, Natura has developed studies comprising practically all OMICs approaches both human skin and plant substrates

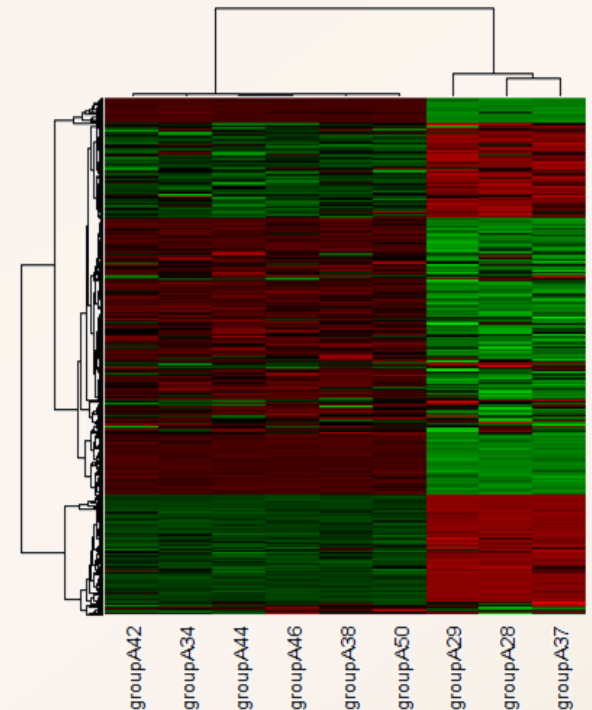
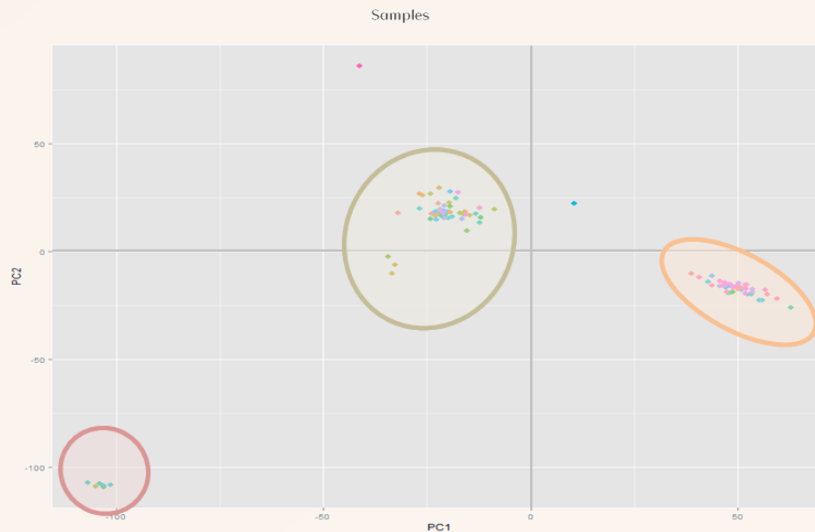
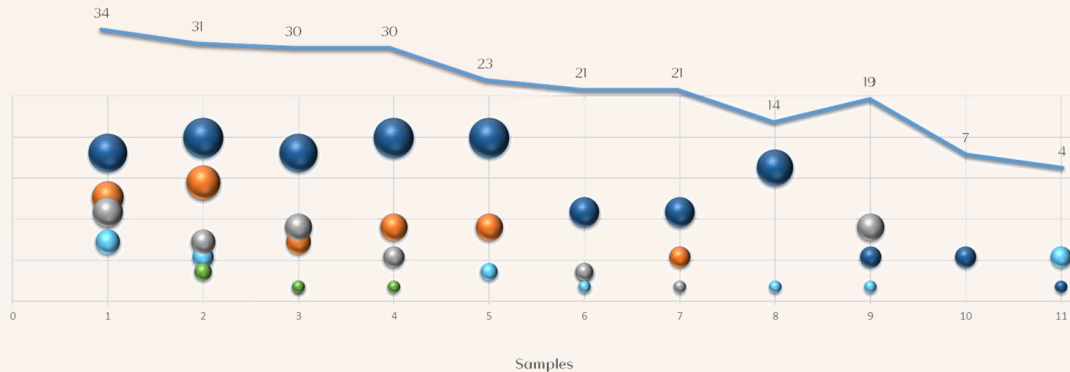


Here, I will address the **transcriptomics platform**

# Transcriptomics Studies for ex vivo functionalities

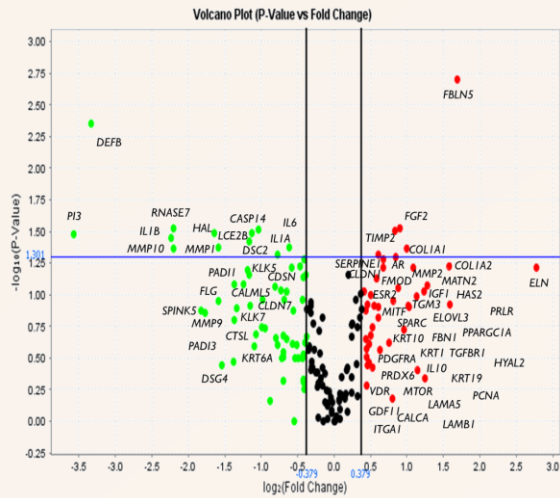
Natura has developed customized methodologies for skin needs from 96 to 384 genes evaluated grouped by classifications as biological mechanisms or biological functions

Allows the identification of **differential profiles** for gene expression of cosmetic ingredients and formulations



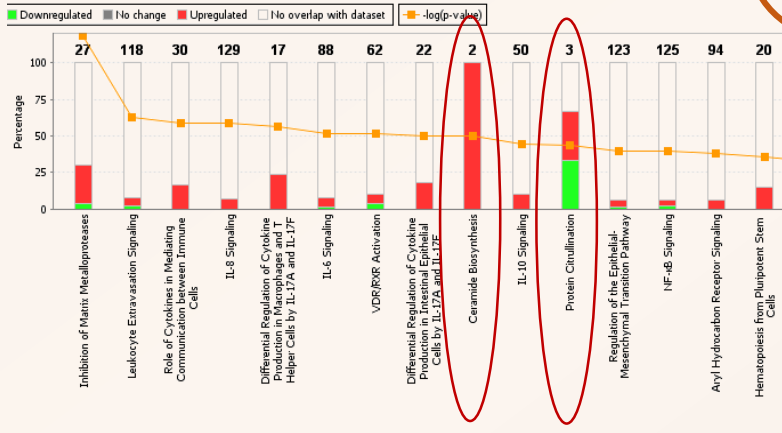
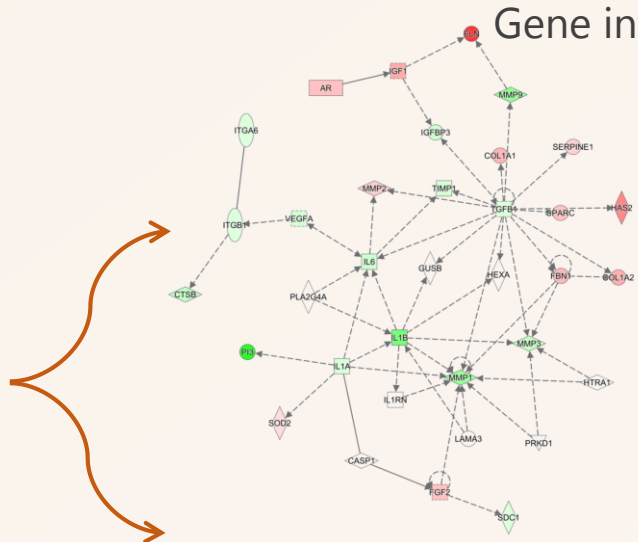
# Transcriptomics Studies for ex vivo functionalities

Instead of testing just one mechanism, we identify all the **real potentiality** of a cosmetic ingredient or formulation



Gene expression profile

## Gene interaction maps



Relevant biological pathways

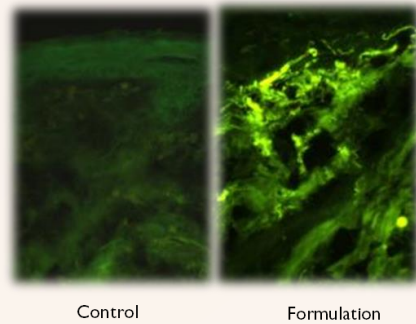
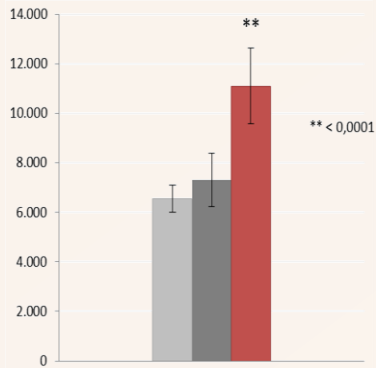
Traduction to skin benefits

- Biosynthesis of ceramides
- Epidermal keratinization
- Lipid metabolism

**BARRIER INTEGRITY**

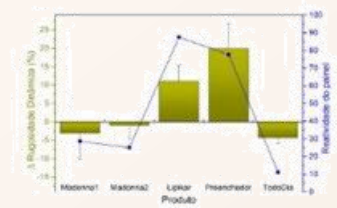
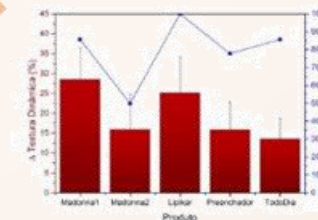
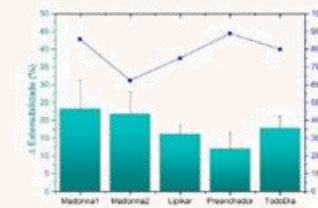
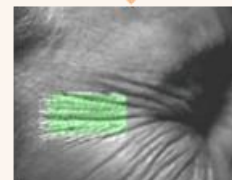
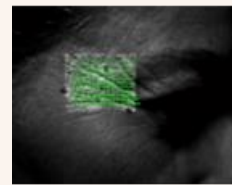
# Transcriptomics associated with complementary molecular assays expanding the potential of perceived clinical benefits

After the identification of potential, Natura ensures real functionality by complementary molecular assays



Protein quantification by immunofluorescence (dozens of proteins)

## Clinical assay

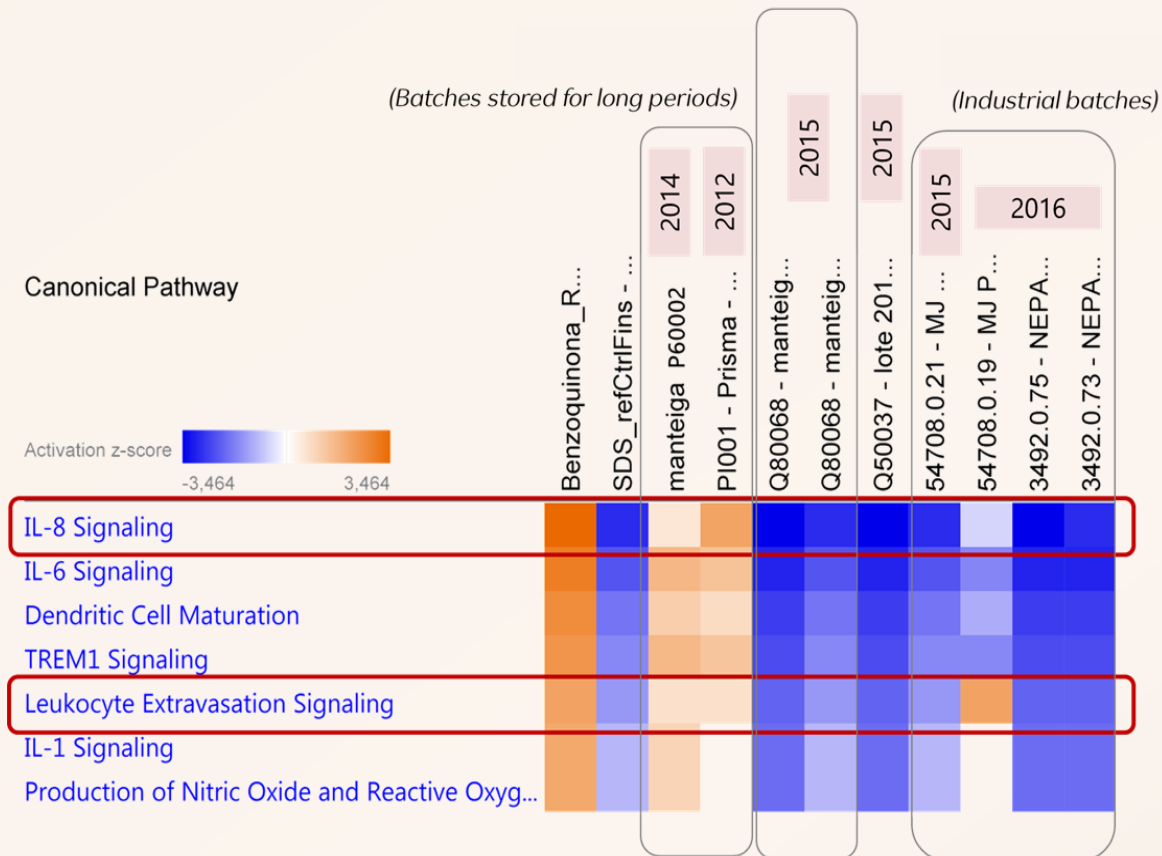


# Transcriptomics Studies for risk assessment

Allows the identification of differential profiles of inflammatory pathways activation

Natura has developed an optimized method for screening of specific 43 genes to identify the potential to allergenicity

(Batches with different experimental conditions: refining, oxidation, etc)

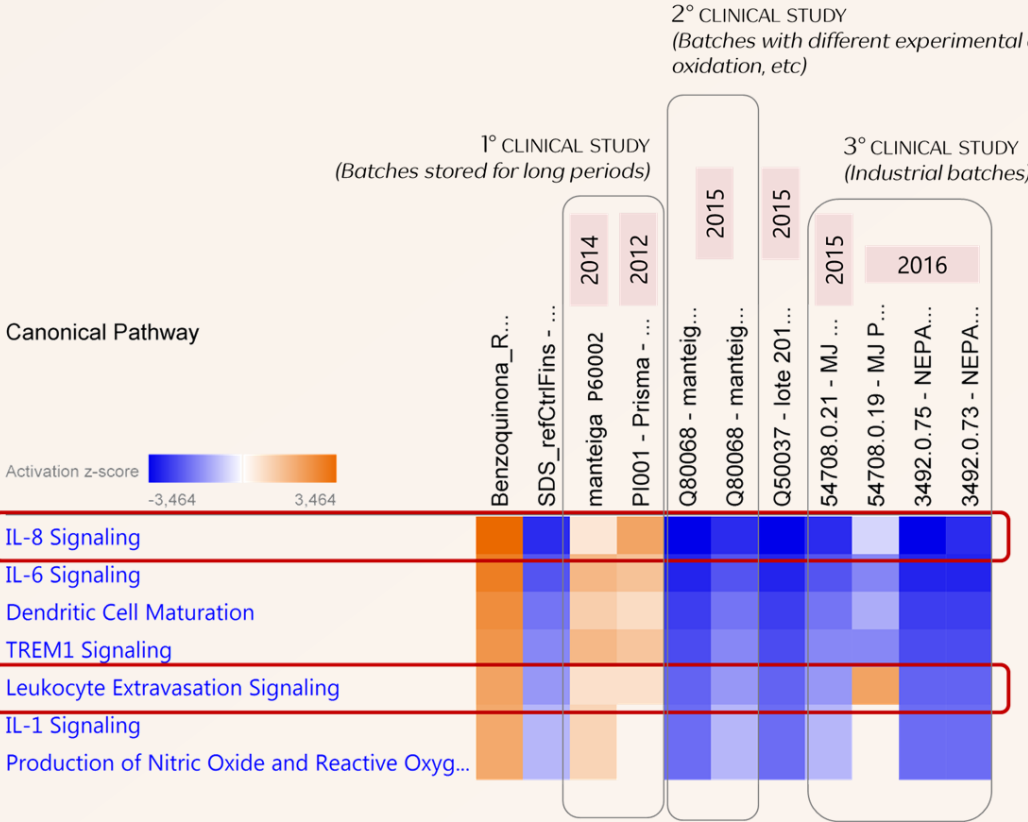




# Transcriptomics Studies for risk assessment

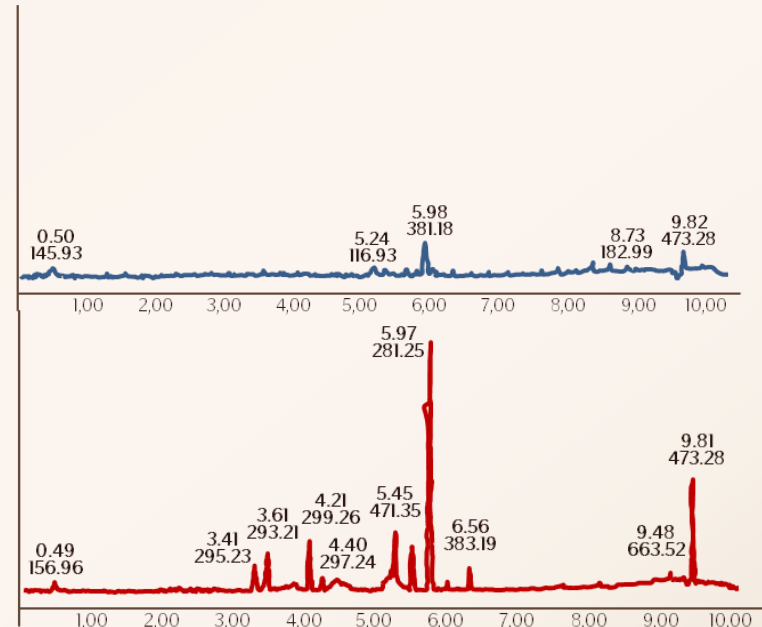
## Clinical Data

Correlation with adverse responses in clinical sensitization panel



## Metabolomics

Associated with profiles of chemical composition of ingredients



# OMICS platforms

Large amount of data generated  
Huge biological and molecular database

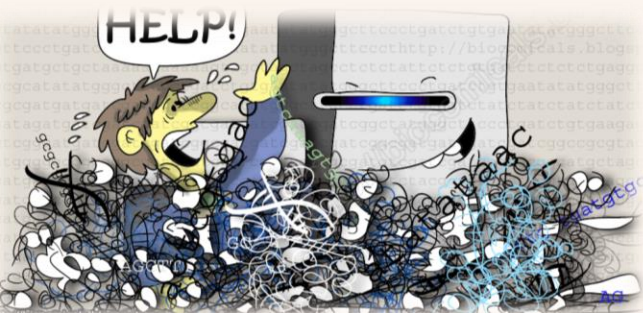
Identification of trends and prediction of biological responses



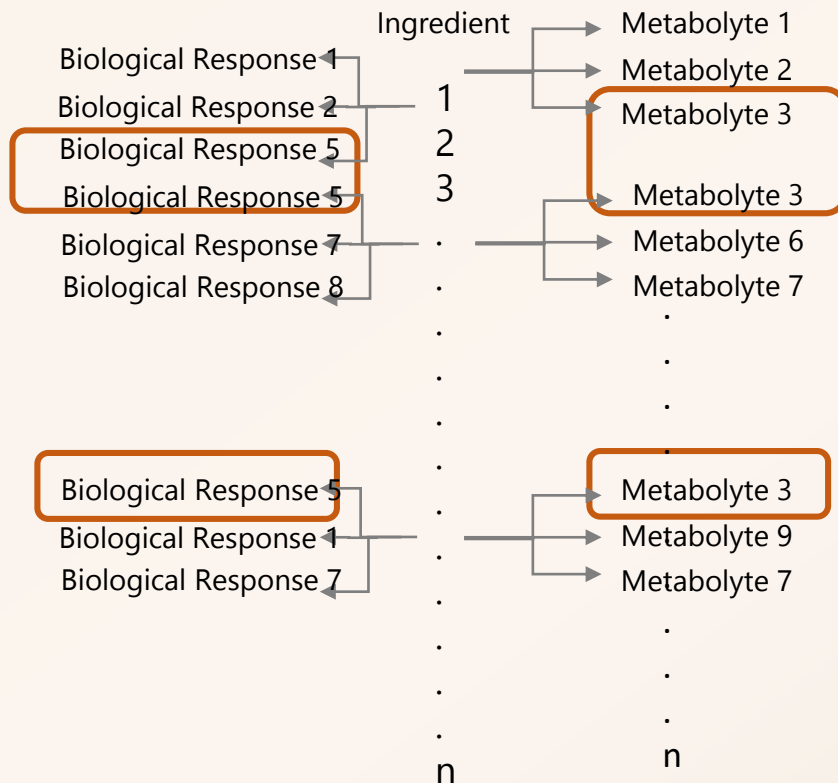
254 cosmetic ingredients  
(mixtures of chemical compounds)

94 formulations (mixtures of cosmetic ingredients)

... and increasing



## Bioinformatics



Reduction of tests, costs and time!

## CONCLUSION

Merging **more complex biological models** with **large-scale approaches** allows a better understanding of the **complexity of the biological response** after exposure to cosmetic ingredients...

...increasing the potential to **predict clinical responses in vivo** and for developing **new alternative methods to animal testing.**





Obrigada!  
Thank you!

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