

# Understanding the Skin Microbiome

**Luc AGUILAR**

PhD, Advanced Research, Research & Innovation

**Magali MOREAU**

PhD, Advanced Research, Research & Innovation



**SKINALLIANCE**  
IN DERMOCOSMETIC SCIENCE

# GUT MICROBIOME LEADING THE WAY

- From Scientific Communities to Public Awareness

- Growing implications in Human Health



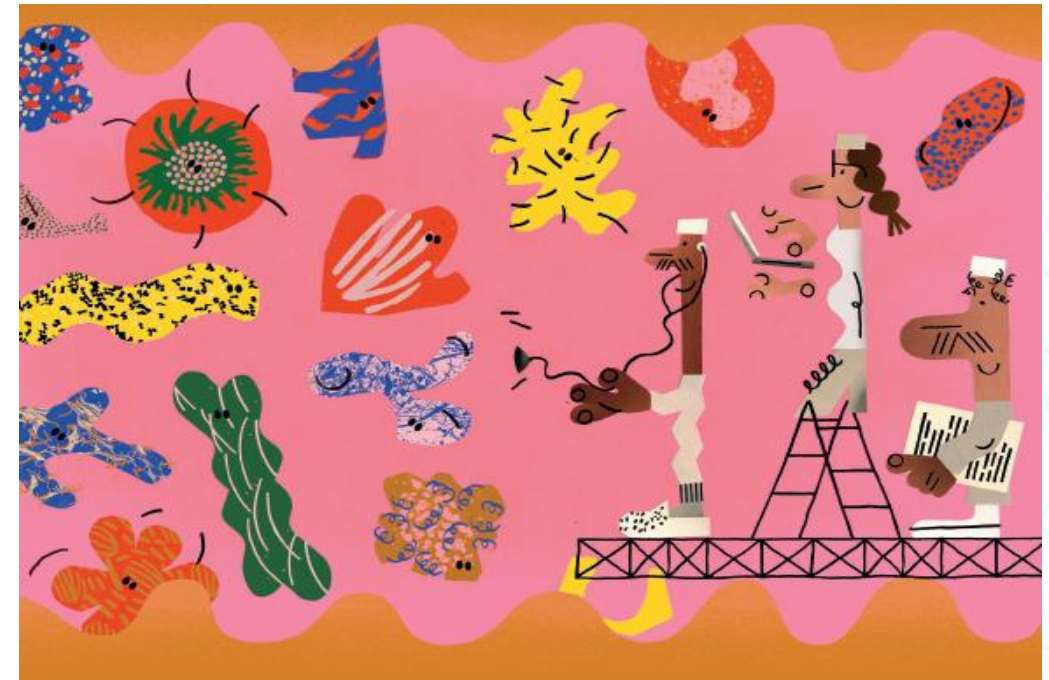
- Obesity
- Inflammatory bowel disease
- Gastric ulcers
- Asthma/allergies
- Autism
- Autoimmune diseases
- Cancer
- Dental cavities
- Depression and anxiety
- Diabetes



# GUT MICROBIOME LEADING THE WAY

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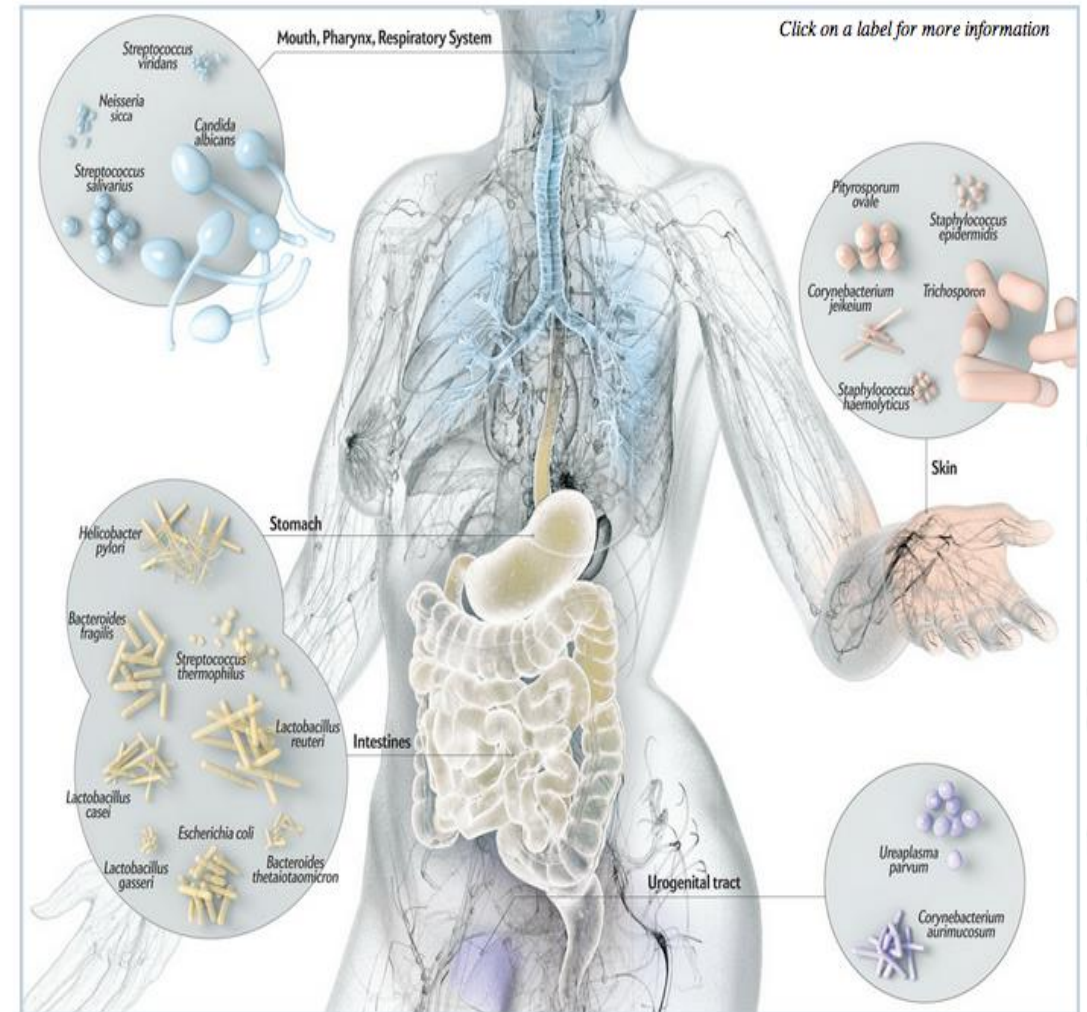
**GUT MICROBES JOIN THE FIGHT AGAINST CANCER**

# THE MICROBIOME

« You are not human,  
you are a walking colony, ... »

J Raes (TED)

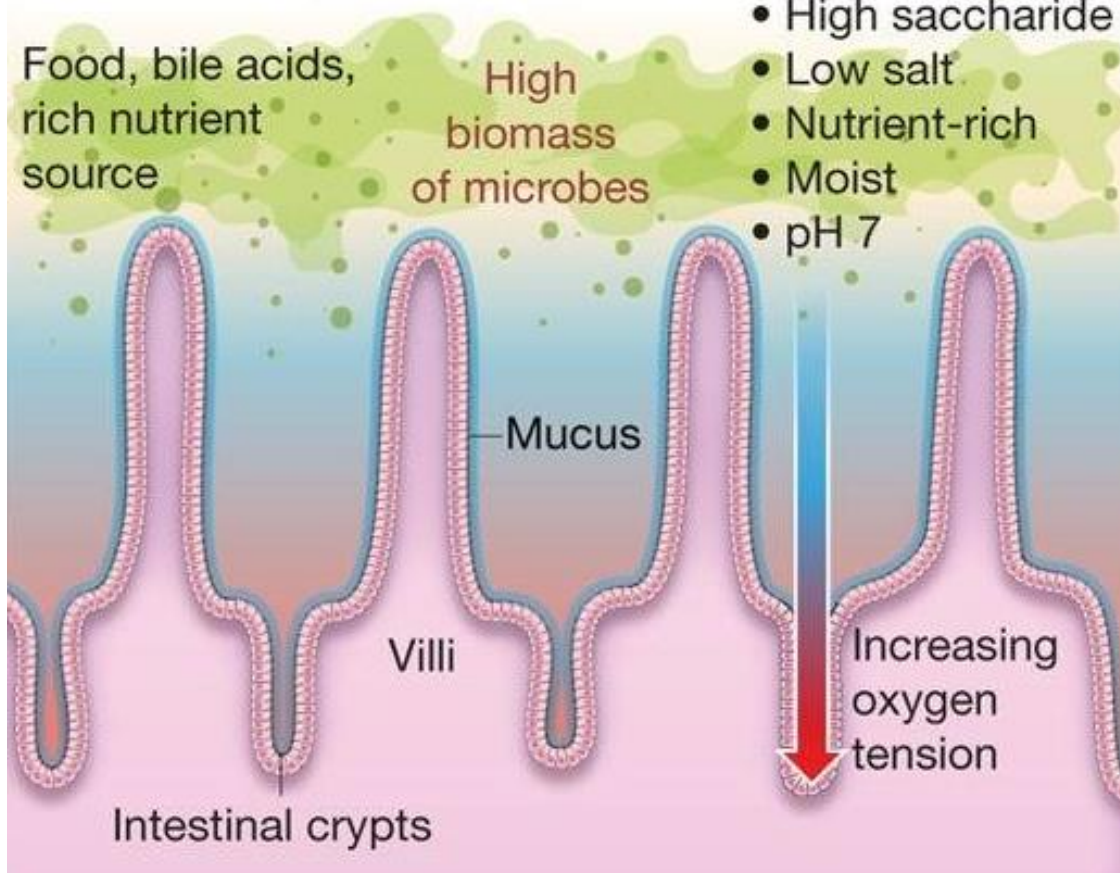
- > **99%** of our gene
- > **50-90%** of our cells
- > **36%** of the small molecule in blood transit from the gut microbiome



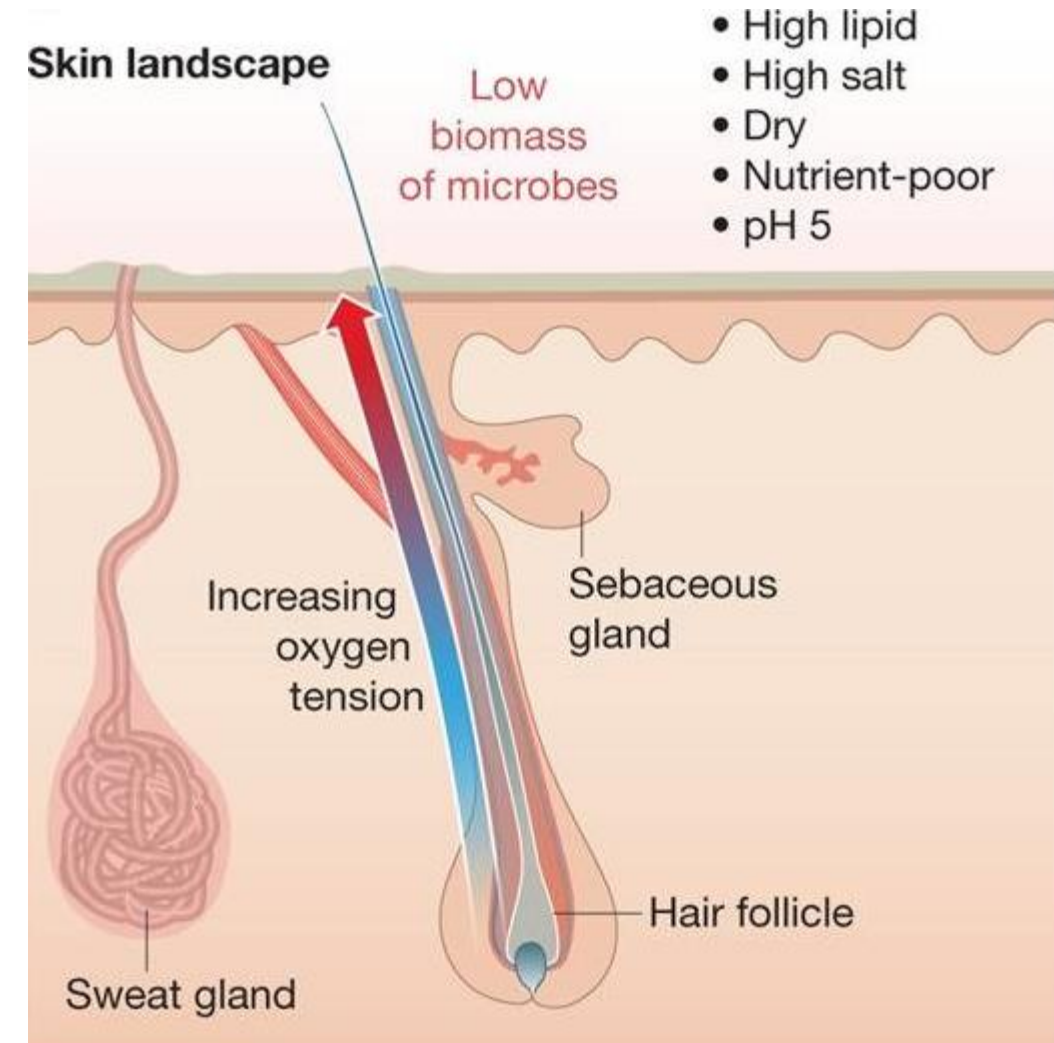


# CHALLENGE OF STUDYING SKIN MICROBIOME

## Colon landscape



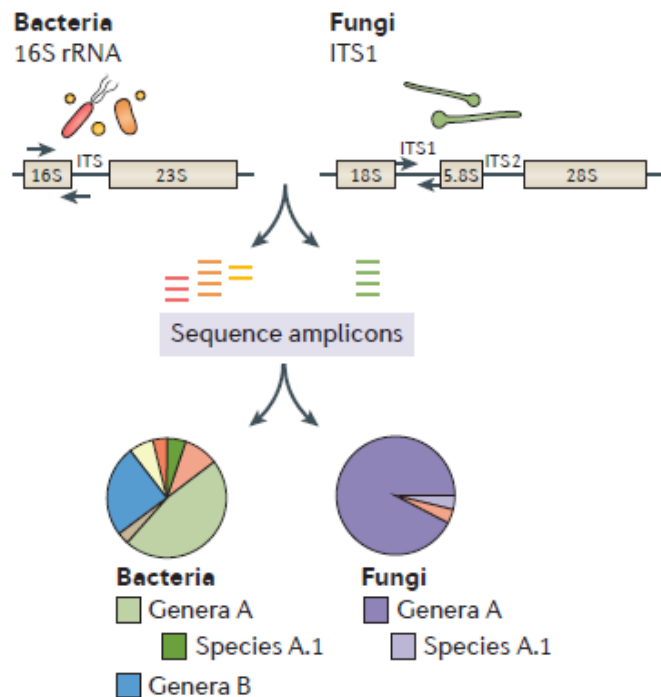
## Skin landscape



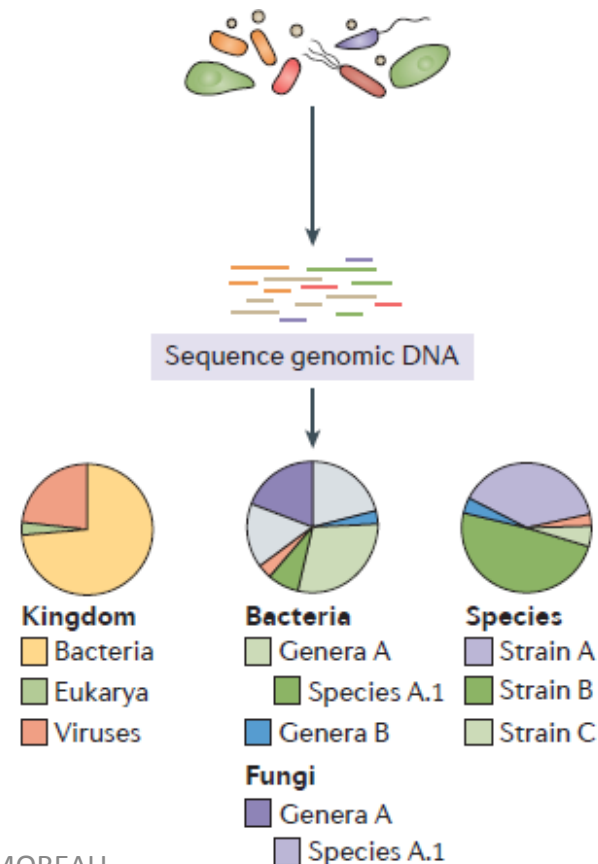
# MAPPING THE MICROBIOME

- DNA sequencing technologies

## PCR Amplification



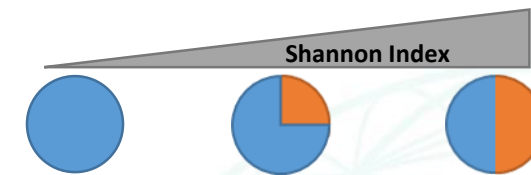
## Metagenomics



- Glossary

### > $\alpha$ diversity (Shannon):

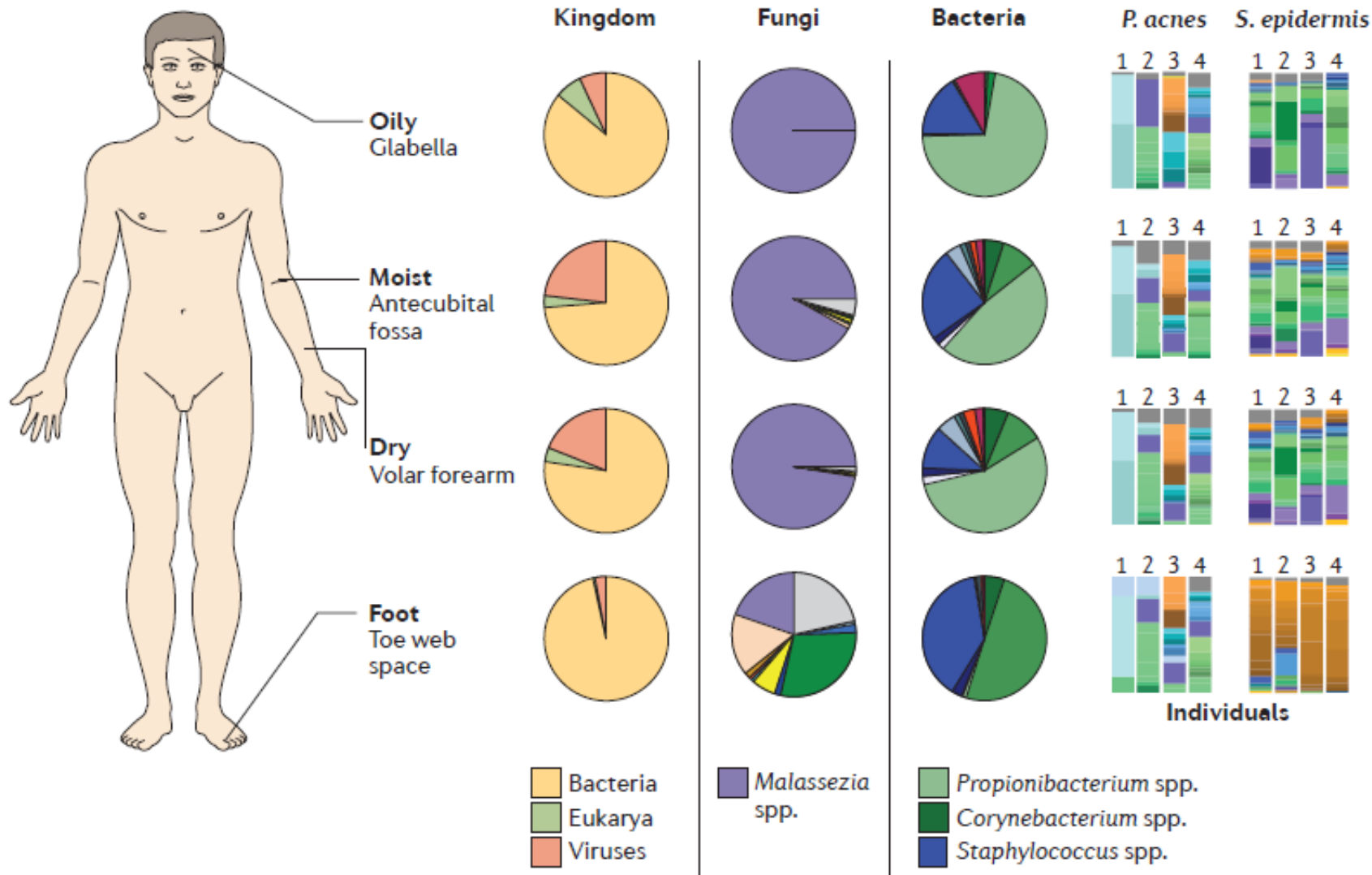
Species Richness and evenness of sample



### > $\beta$ diversity (Bray Curtis):

Dissimilarity in the microbial community between samples

# SKIN MICROBIOME SHAPED BY BODY SITE & INDIVIDUAL

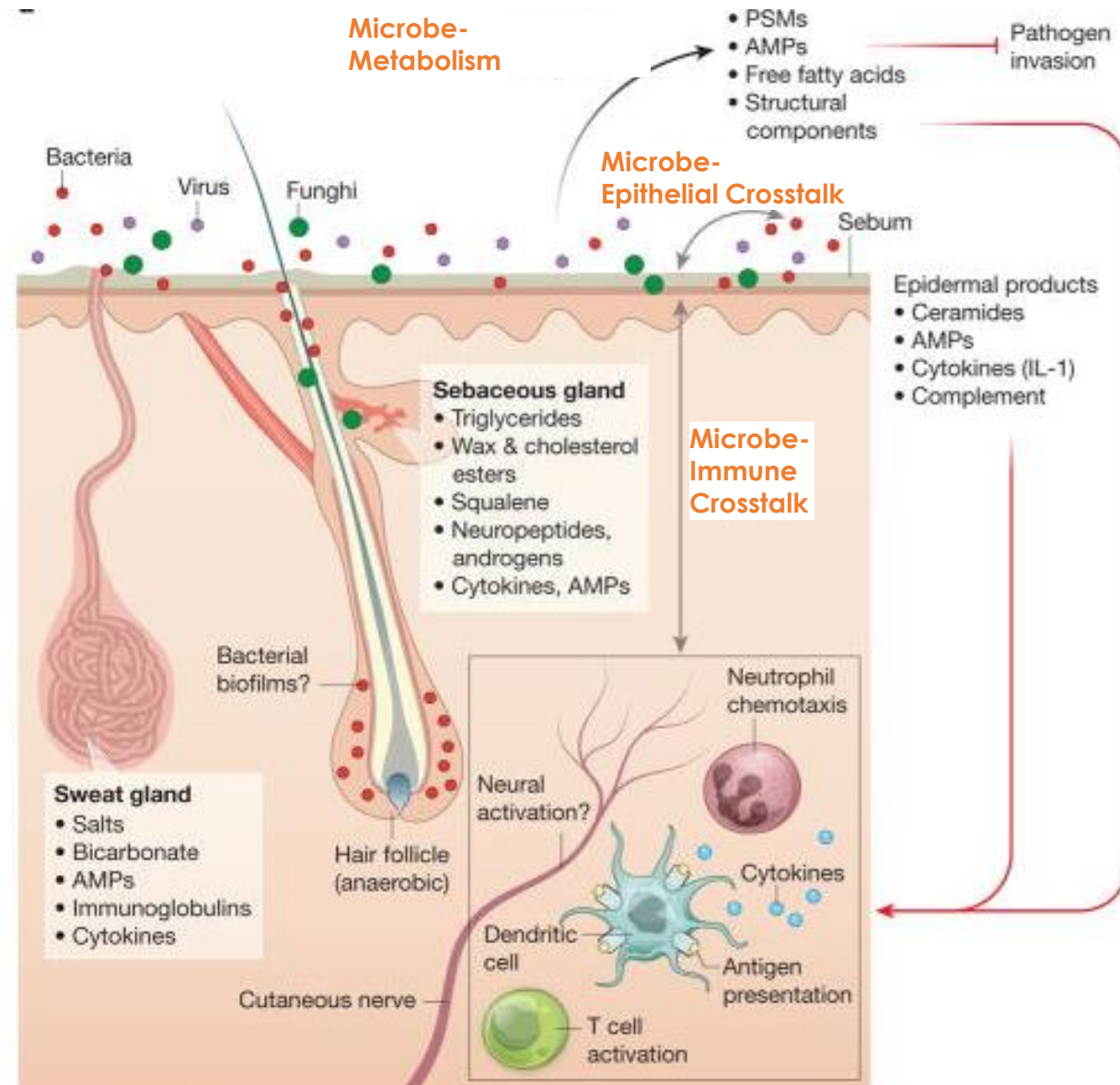


Influenced by

- **Host Physiology**
- **Lifestyle**
- **Immune system**
- **Environment**



# SKIN MICROBIOME IN BALANCE





# SKIN MICROBIOME AND DISEASES

## ■ Atopic Dermatitis



- > Loss of Microbe diversity
- > *S. aureus* in occurrence and severity of flares

## ■ Acne



- > Change of bacterial communities
- > *C. acnes* phylotypes linked to severity
- > *Staph* involved with symptoms?

## ■ Dandruff



- > Overload of fungi (*M. restricta*)
- > Dysbiosis  
*S. epidermidis*/ *C. acnes*

*Fitz-Gibbon et al., JID, 2013*

*Hannigan et al., CSHL Persp. In Medicine 2013*

*Flores G. et al, JDD 2014*

*Clavaud et al., PlosOne 2013; Exp. Dermatol 2015*

*Dreno et al. JEADV 2018*

# SKIN MICROBIOME AND DISEASES: EARLY EVIDENCE

## ■ Psoriasis



- > Increased diversity
- > Decrease in immunoregulatory bacteria *S. epidermidis* and *C. acnes*
- > Higher colonization *S. aureus*

## ■ Rosacea

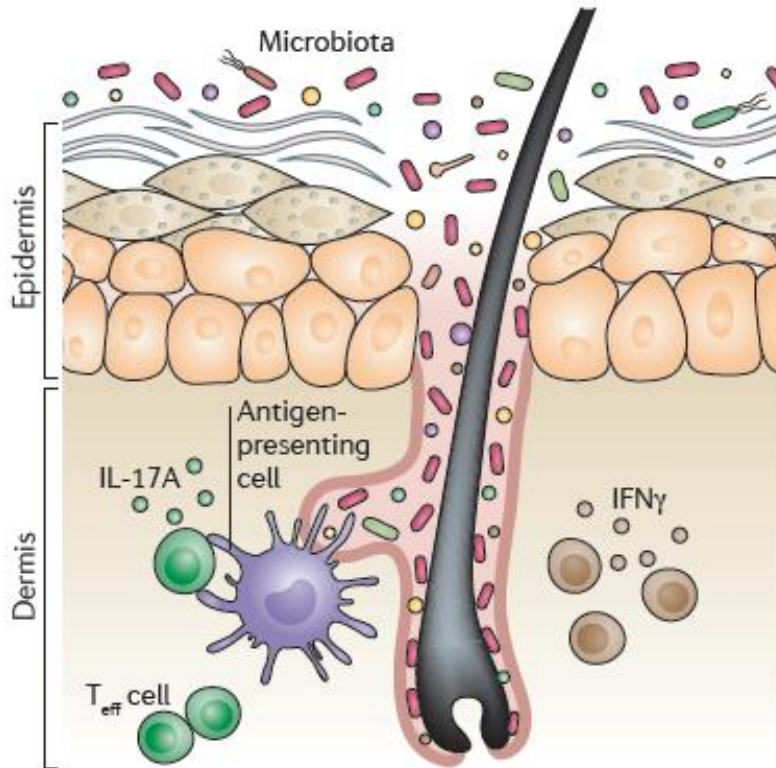


- > Decrease diversity

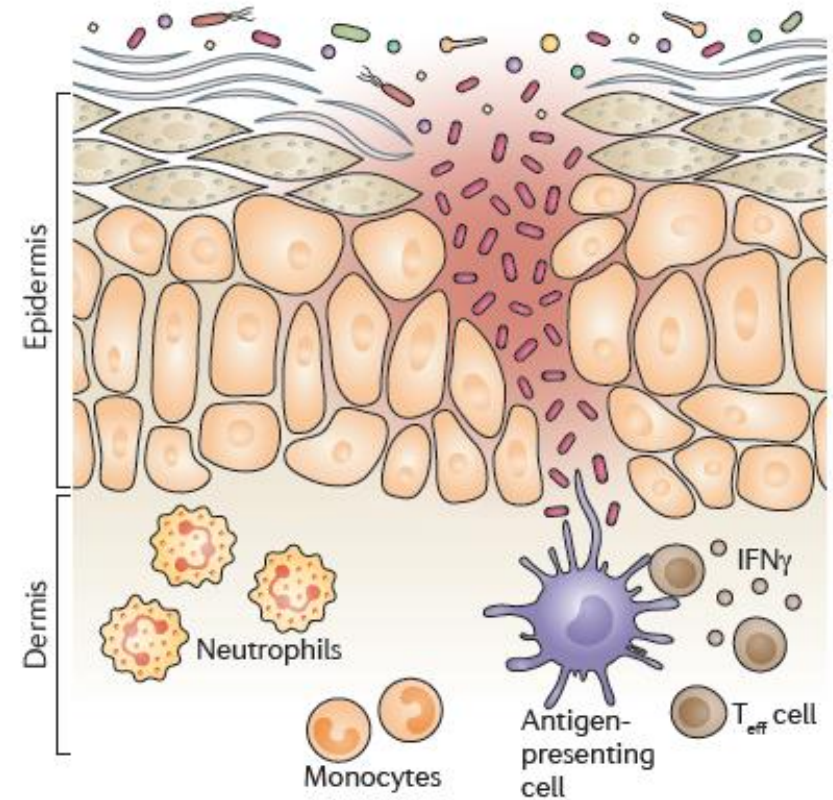


# IMMUNE SYSTEM AND SKIN MICROBIOTA: A CONSTANT CROSSTALK

- Homeostatic Immunity



- Inflammation and Dysbiosis



# SKIN MICROBIOME AND DISEASES

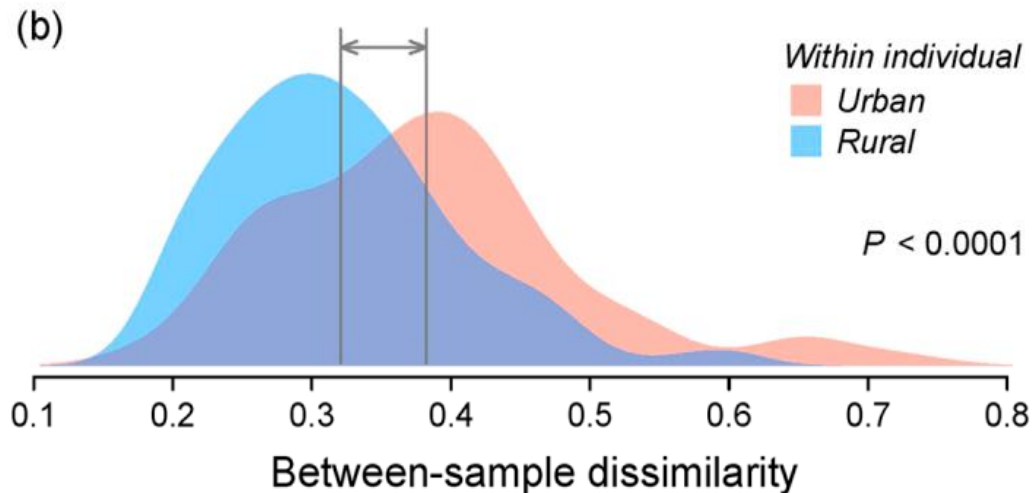
- Urban exposures and allergies





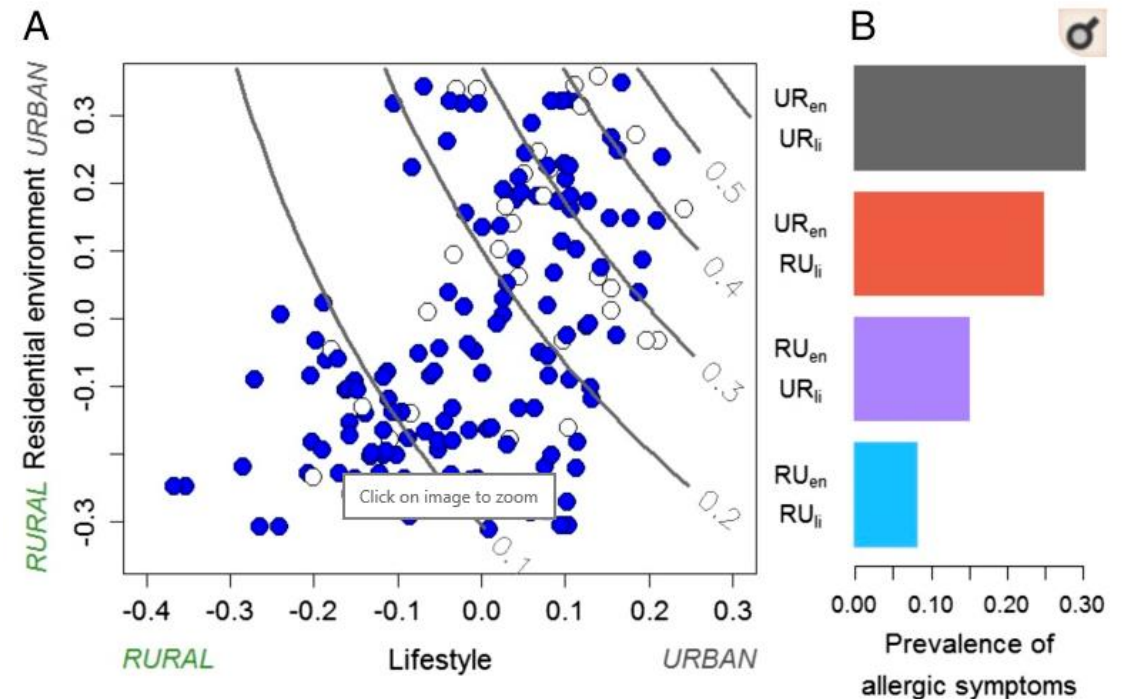
# SKIN MICROBIOME, URBAN LIFESTYLES AND ALLERGIES

- Urban and rural lifestyle



(in 275 children & teenagers)

- Environmental microbes on skin linked to allergic symptoms

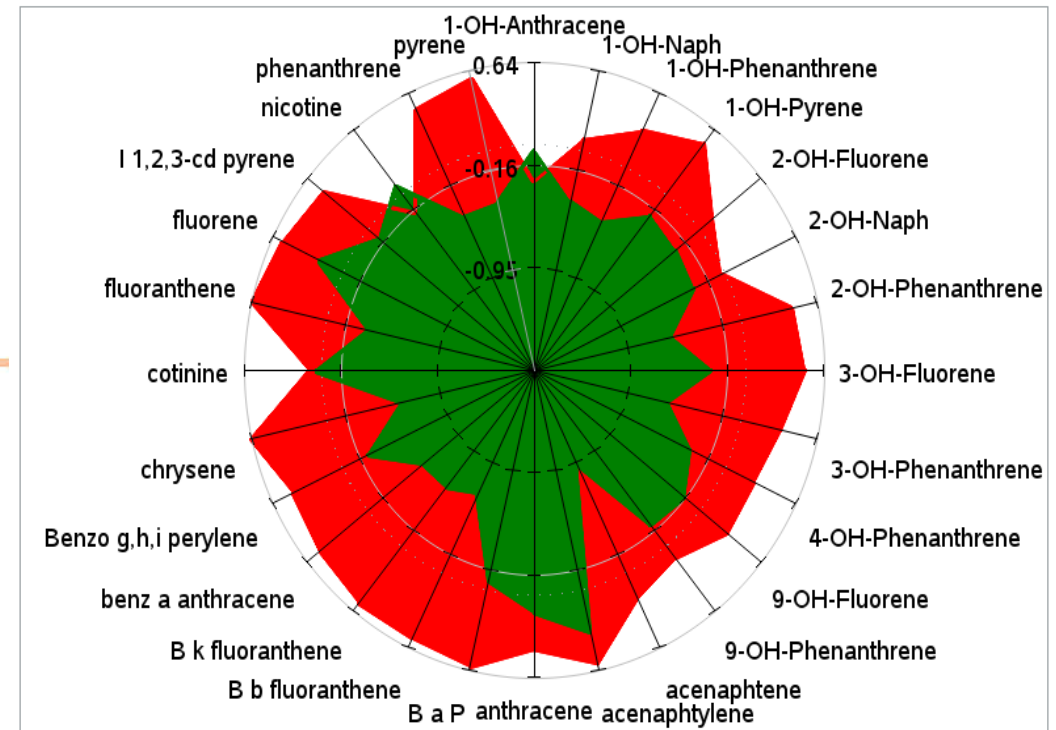


# SKIN MICROBIOME, URBAN LIFESTYLES AND ALLERGIES

- Urban Exposures of pollutants



■ Low     ■ High

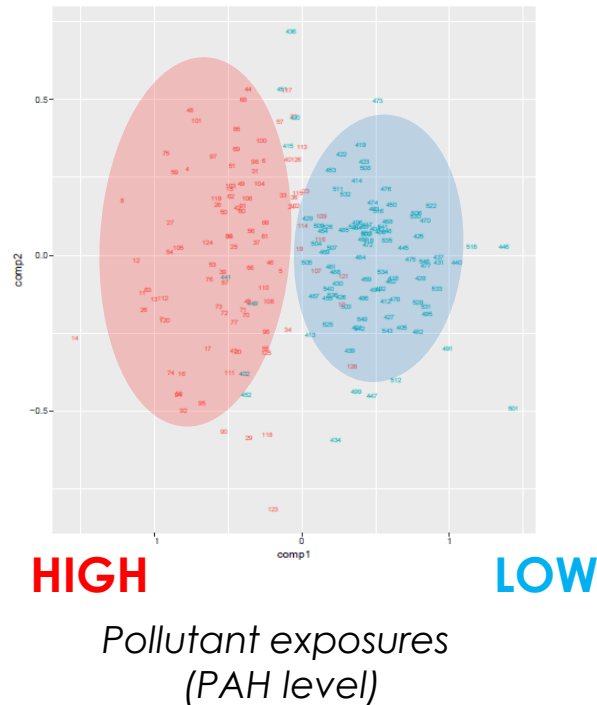


*(Clinical Study, China, n=200, >10 yrs exposures)*

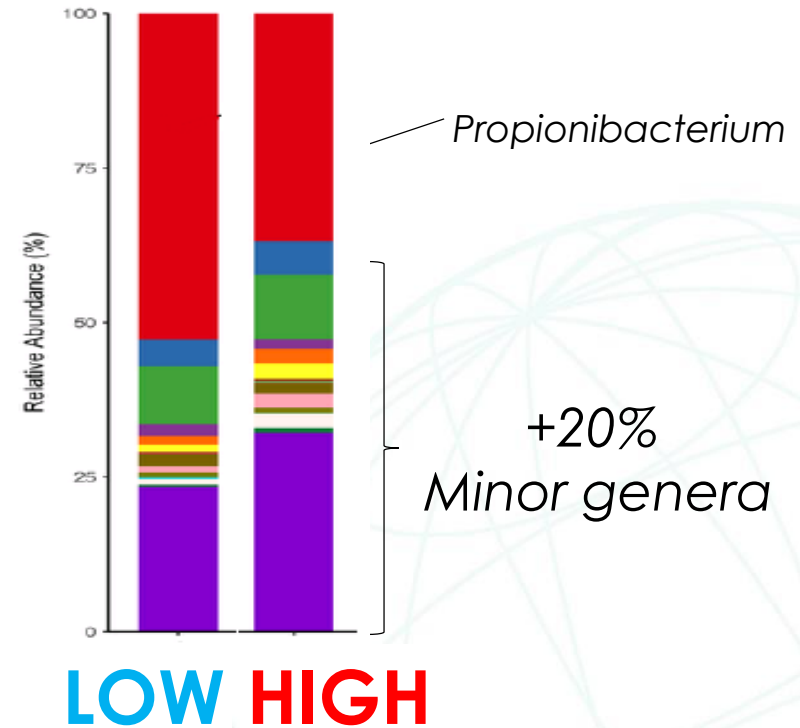


# SKIN MICROBIOME, URBAN LIFESTYLES AND ALLERGIES

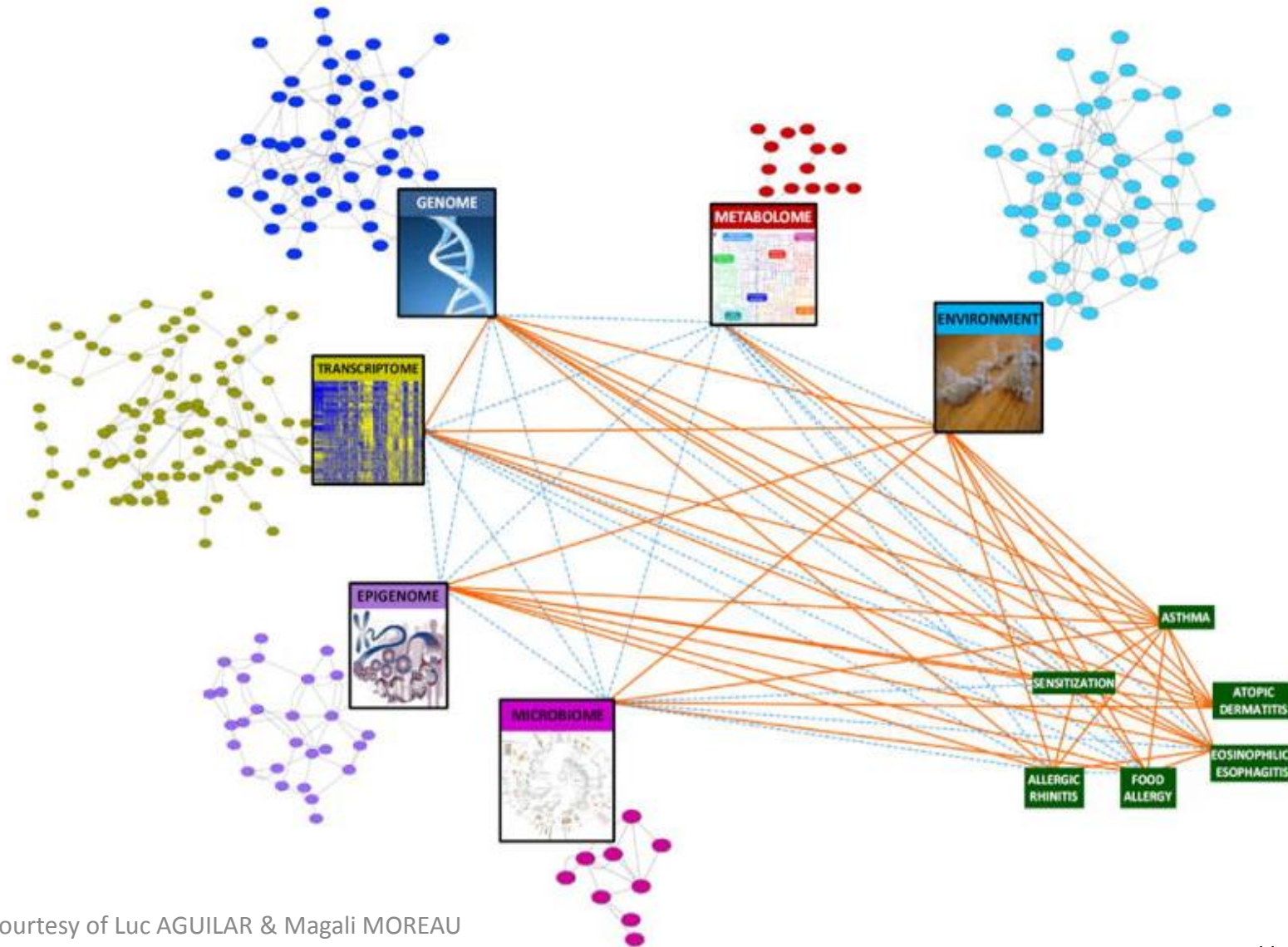
- Skin microbiome correlates with urban exposures



- Skin Enriched with environmental microbes



# FROM DESCRIPTION TO CAUSATION & MECHANISM



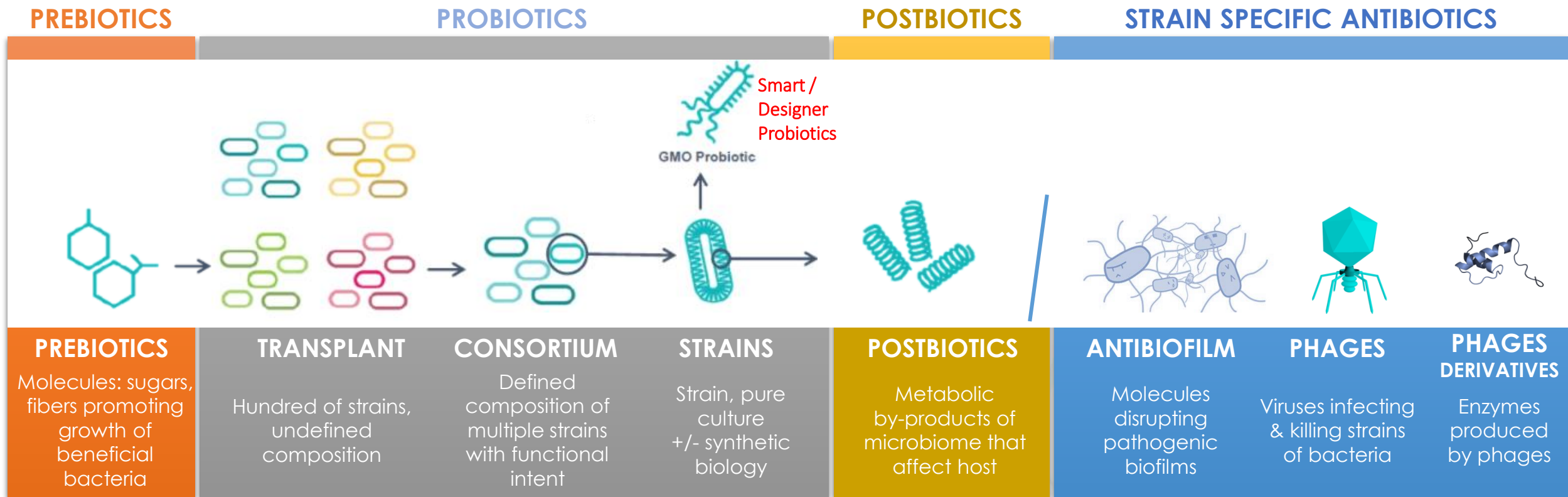


# FROM MICROBIOME KNOWLEDGE TO PRODUCT

- Microbiome-specific **active ingredients**
- Develop **diagnostic tools**



# HOW TO MODULATE THE SKIN MICROBIOME?



# POSTBIOTIC

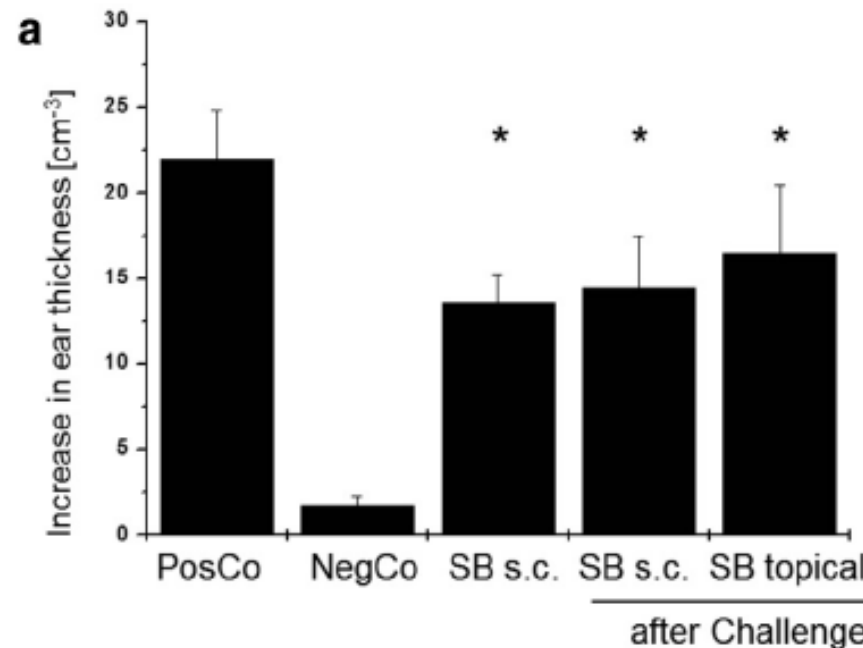
## POSTBIOTICS



### POSTBIOTICS

Metabolic by-products of microbiome that affect host

- > Using Short Chain Fatty Acid to regulate inflammation

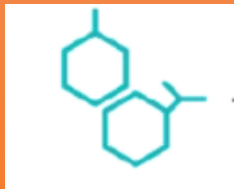


Sodium Butyrate (SB) attenuates an ongoing skin hapten-induced contact hypersensitivity



# PRE- AND POSTBIOTIC

## PREBIOTICS



### PREBIOTICS

Molecules, sugars, fibers, promoting growth of beneficial bacteria

## POSTBIOTICS

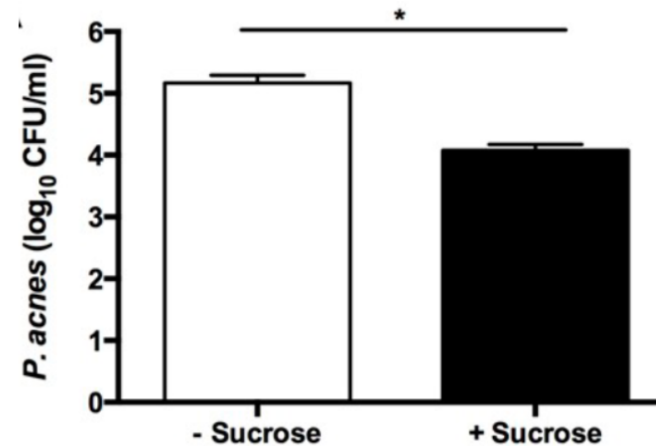


### POSTBIOTICS

Metabolic by-products of microbiome that affect host

> Foster Growth of beneficial bacteria

> Control /balance the community metabolites



Sucrose

↗ *S. epidermidis*

↘ Reduce *C. acnes*

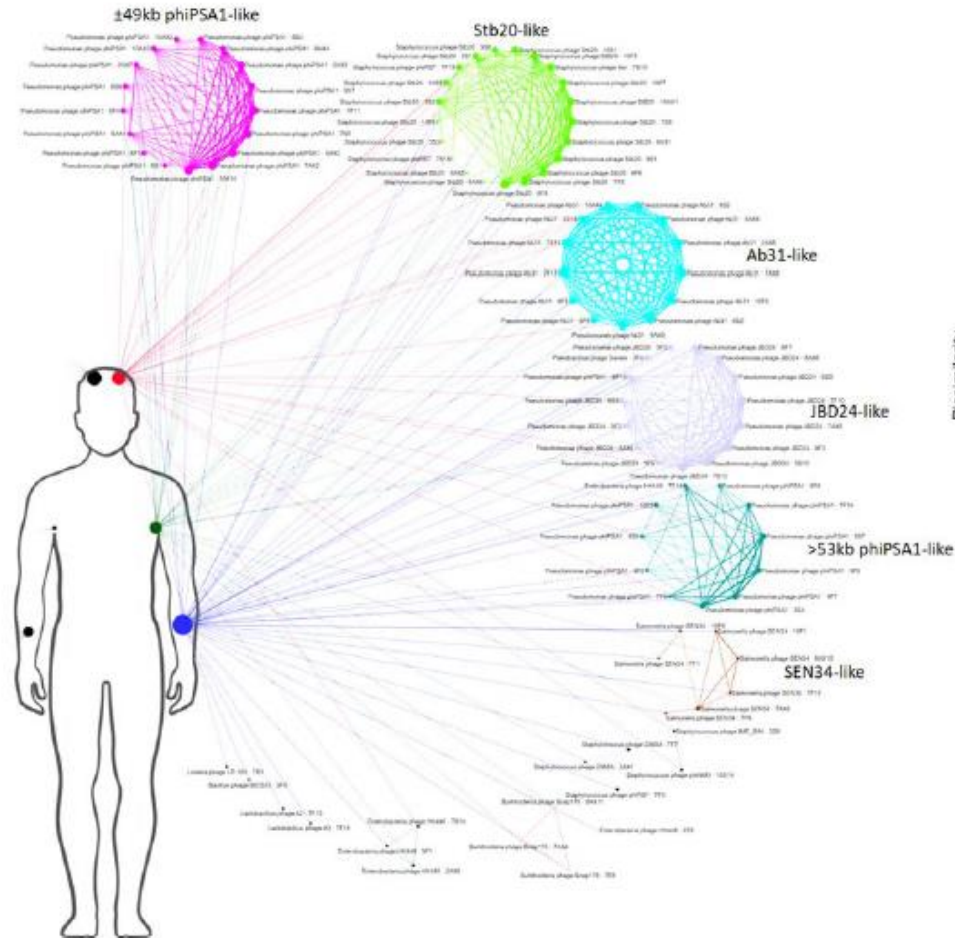
# VIROME & PRECISE MICROBIOME MODULATION

## STRAIN SPECIFIC ANTIBIOTIC



## PHAGES

Viruses infecting & killing strains of bacteria



Phycisimilantfu

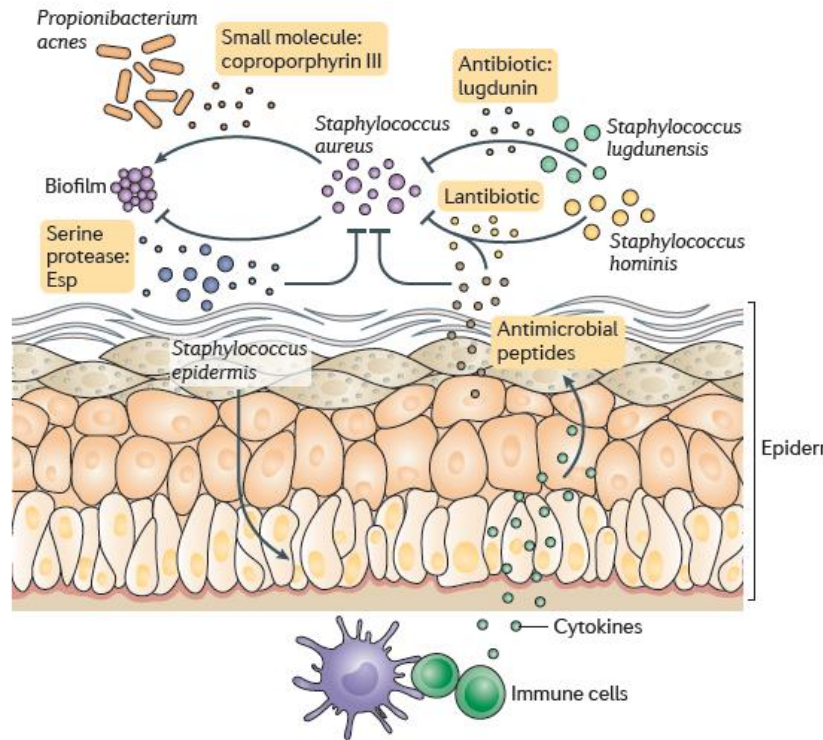
# TRANSPLANTING MICROBES TO TREAT ATOPIC DERMATITIS

## PROBIOTICS

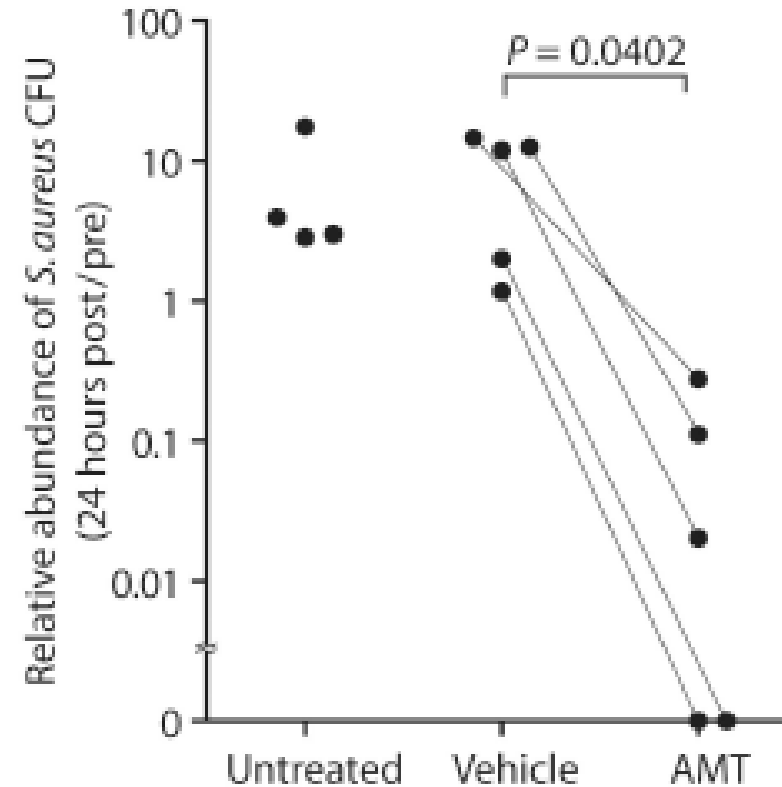


## TRANSPLANT

Hundred of strains, undefined composition

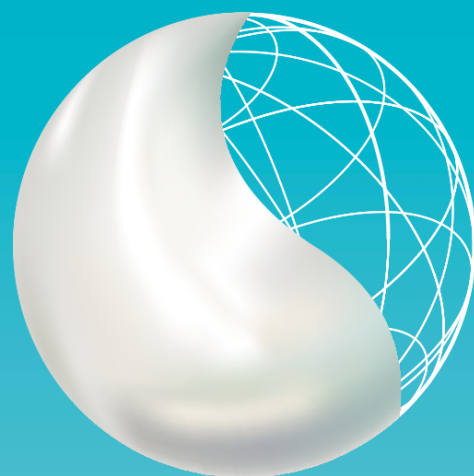


- *S. hominis* & *epidermidis* CoNS transplantation (AMT)









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