



Demystifying Skin Microbiome

Bacteria on Your Skin: Gross or Gorgeous?

UL Prospector Webinar | September 13th 2018



Manasi Chavan & Anne Young



Care
Creations™



BASF
We create chemistry

Agenda

- 1. The Microbiome trend**
- 2. Why is there a buzz?**
- 3. The Skin, Microbiota and environmental interactions**
- 4. Skin Microbiota & Cosmetics**
- 5. How to study the skin Microbiota?**
- 6. BASF Solutions**

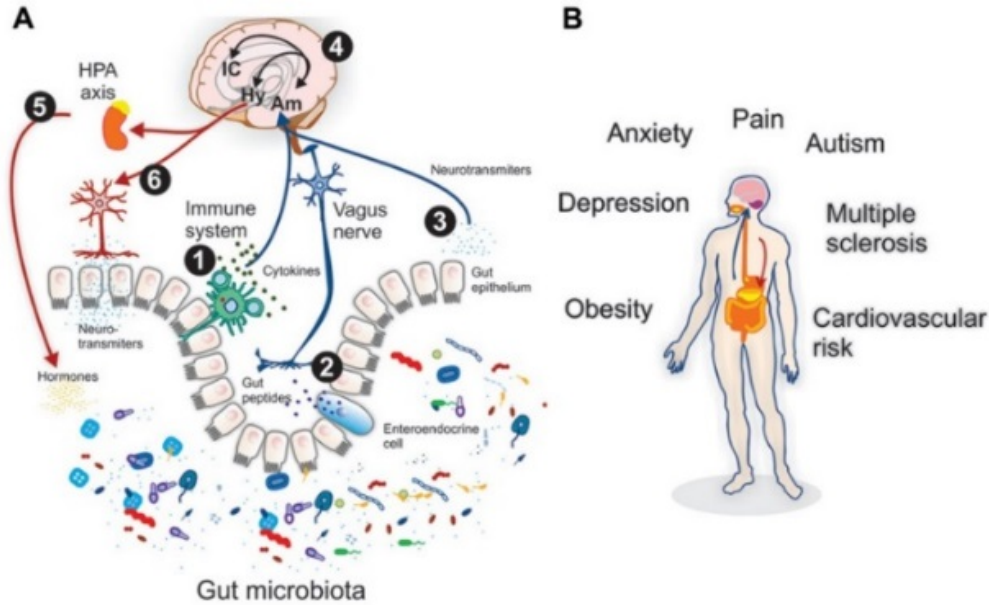
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Microbiome trend – a wellness trend

- The microbiota and gastrointestinal tract are connected to the brain
- Connection is vital for maintaining homeostasis
- Involved in the etiology of several metabolic and mental dysfunctions/disorders

Beyond yogurt



Source Mintel

Montiel-Castro AJ et al. The microbiota-gut-brain axis: neurobehavioral correlates, health and sociality. *Frontiers in Integrative Neuroscience*

Microbiome trend in Personal care Industry

Cosmetics Business reveals the 5 biggest 'healthy beauty' trends of 2018 in new report

15-Feb-2018



[BODY CARE](#) | [HAIR CARE](#) | [INGREDIENTS](#) | [SKIN CARE](#)

Healthy and clean beauty is inspiring some of the biggest industry trends, from microbiome body care to anti-pollution skin care – and that's only just the beginning

What Happened When I Swore Off Soap and Tried Probiotic Skin Care for Two Weeks

allure

BY MEIRAV DEVASH
OCTOBER 19, 2017

REFINERY29

The Invisible Secret That Will Change Your Skin Forever

RACHEL KRAUSE
MAY 4, 2017, 4:30 PM

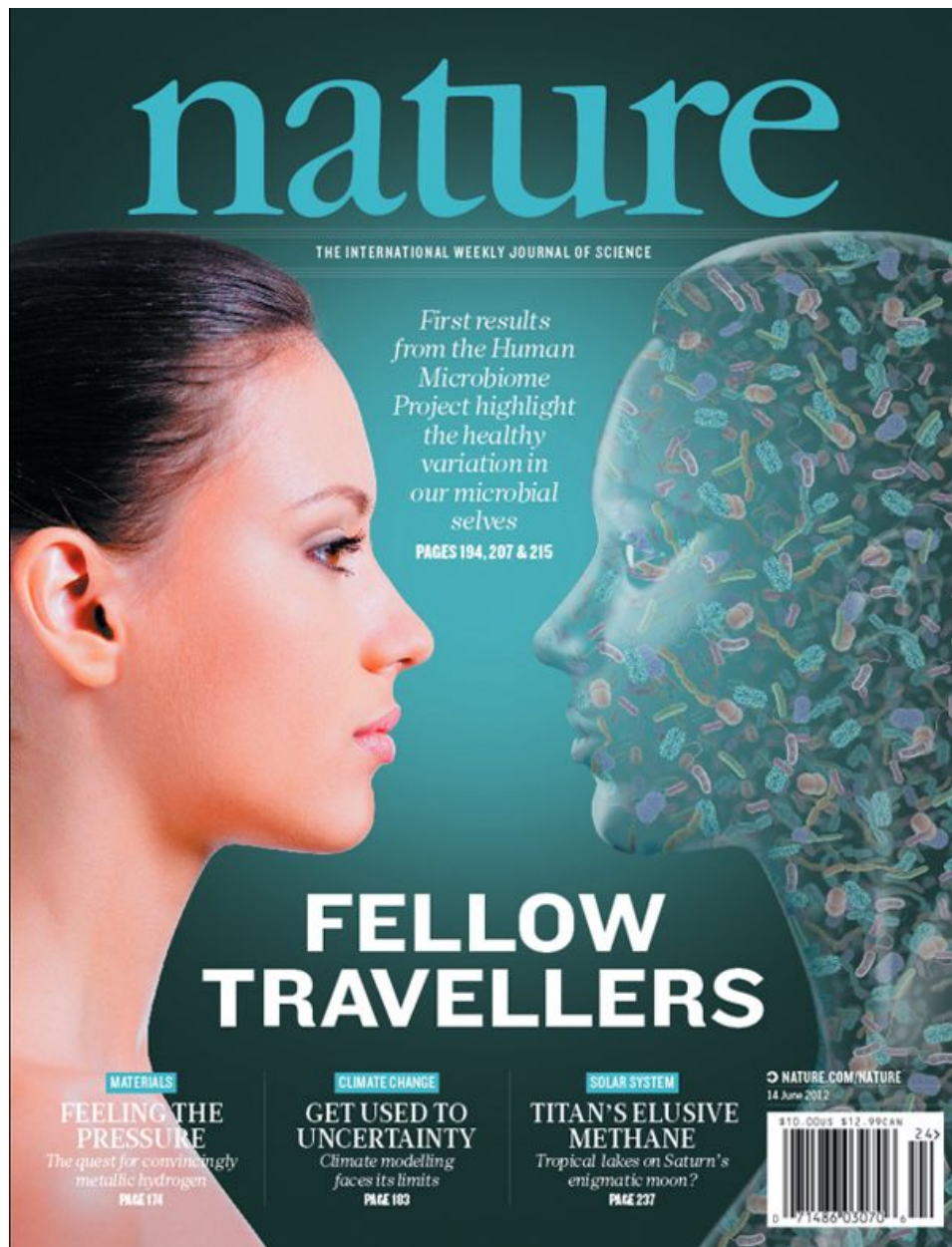
- Driven by high focus of consumers on health and wellness and their awareness of the damage caused by external factors
- Microbiome in skin care - key drivers in growth of premium skin care products, particularly facial moisturisers.
- Trend began in in Asia-Pacific region

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NIH HUMAN
MICROBIOME
PROJECT

ARTICLE

doi:10.1038/nature11234

Structure, function and diversity of the healthy human microbiome

The Human Microbiome Project Consortium*

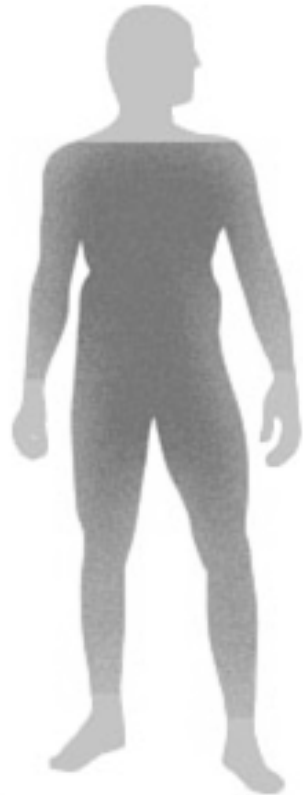
NIH FUND for the comprehensive characterization of the human microbiome and analysis of its role in human health and disease established in 2008

Scientists isolated 1,300 reference strains for sequencing from 300 healthy adults between the ages of 18 and 40 at five major body sites: oral cavity, nasal cavity, skin, gastrointestinal tract and urogenital tract; with a total of 15 or 18 specific body sites.

Microbiota & Microbiome

100 % Human ?

90 % microbes



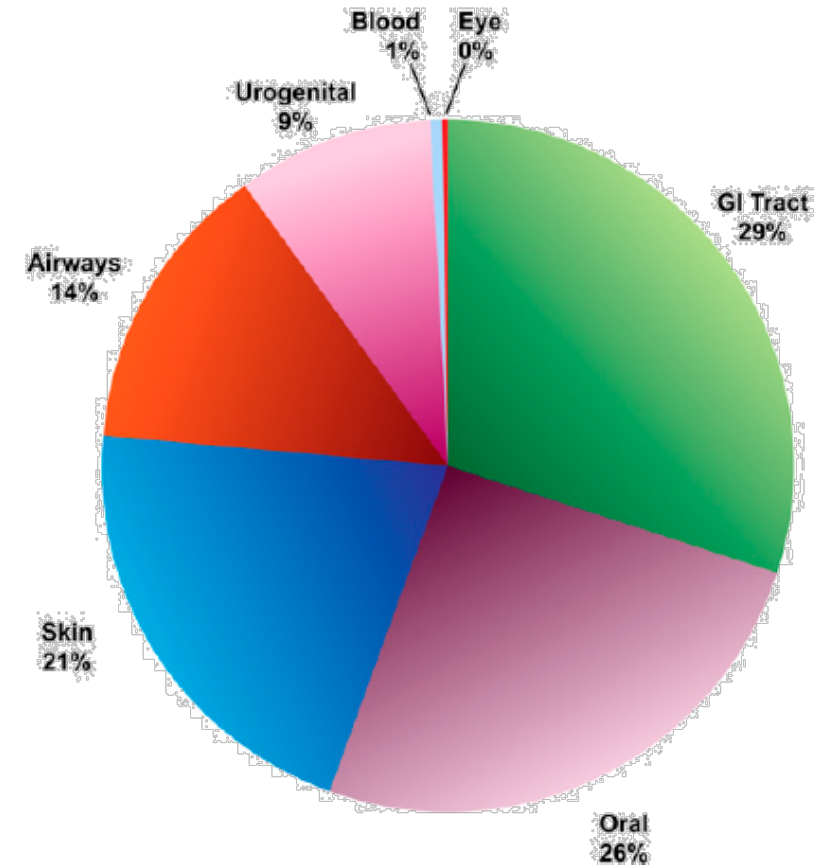
10 % human cells

Microbiota

Entire community of commensal, symbiotic and pathogenic microorganisms that lives inside and at the surface of our bodies

Microbiome

collective genomes of the microbiota





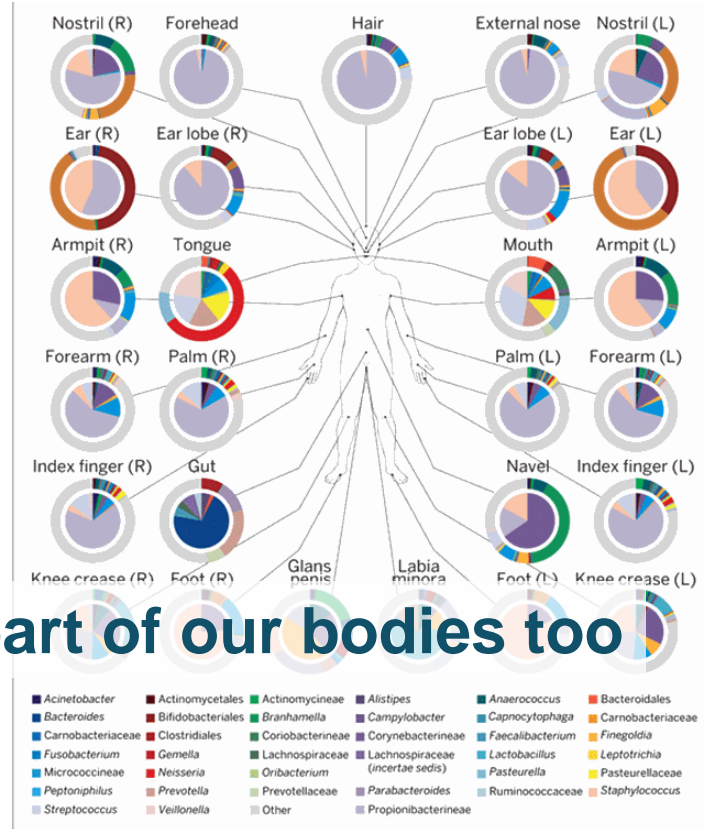
Each Individual has their own microflora....

Talking about diversity!

Our cutaneous microflora is tremendously diverse



- Commensal bacteria
- Opportunistic pathogens
- Fungi
- Virus



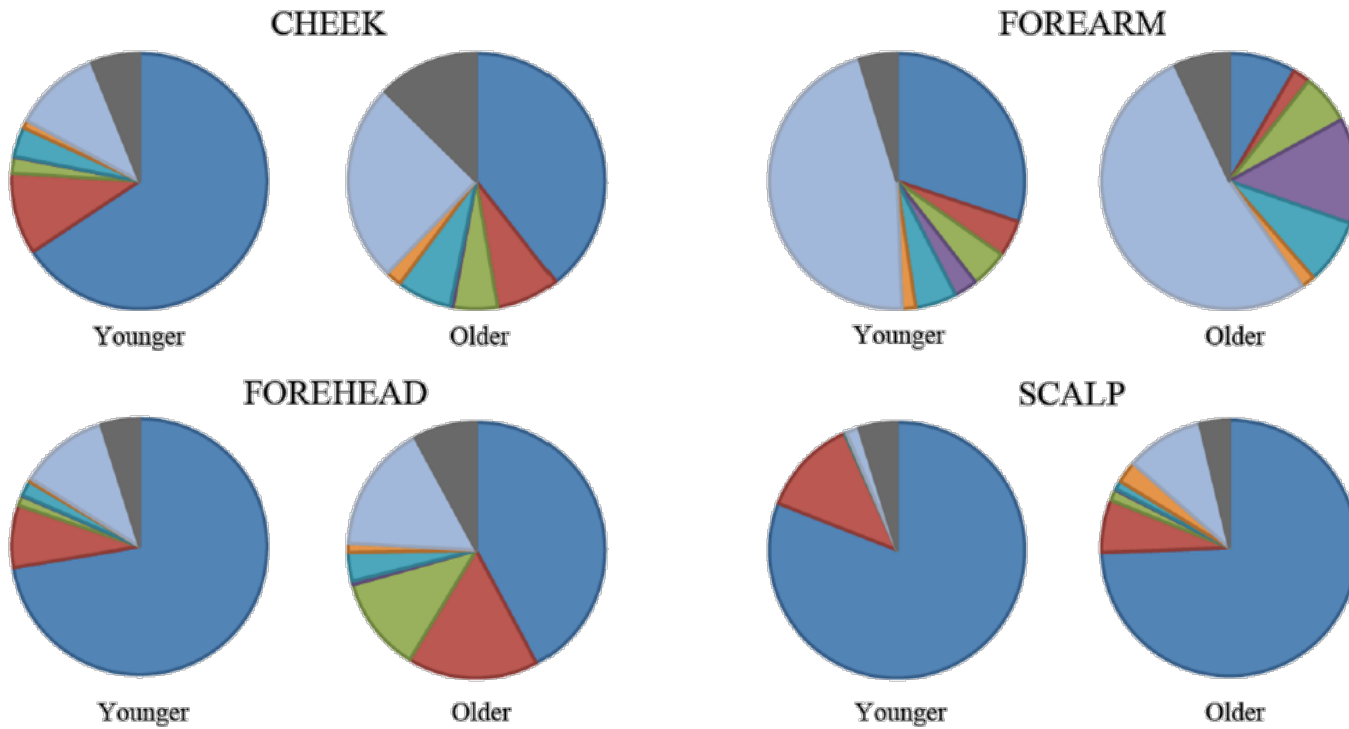
...And each part of our bodies too



Sci Rep. 2017 Sep 5;7(1):10567. Aging-related changes in the diversity of women's skin microbiomes associated with oral bacteria. PLoS One. 2016; 11(4): e0151990. Body Site is a More Determinant Factor than Human Population Diversity in the Healthy Skin Microbiome Nat Rev Microbiol. 2011 Apr; 9(4): 244-253. The skin microbiome

We age! Does our microbiota?

Significant differences are observed between young and old subjects



	P value (welch's t test)			
	CHEEK	FOREARM	FOREHEAD	SCALP
Propionibacterium	0.01472	0.00003	0.00507	0.40431
Staphylococcus	0.62062	0.04466	0.14100	0.12064
Corynebacterium	0.02810	0.32998	0.01198	0.11740
Acinetobacter	0.02835	0.06745	0.22866	0.03240
Streptococcus	0.21788	0.10430	0.21875	0.07764
Prevotella	0.13867	0.92745	0.07764	0.23233

- Propionibacterium
- Staphylococcus
- Corynebacterium
- Acinetobacter
- Streptococcus
- Prevotella
- Others
- UNDEFINED

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The microbiota lives with us and suffers with us!

Behavioral factors

Stressful life

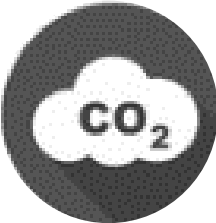
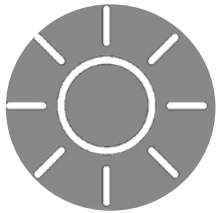


The cult of hygiene...



External factors

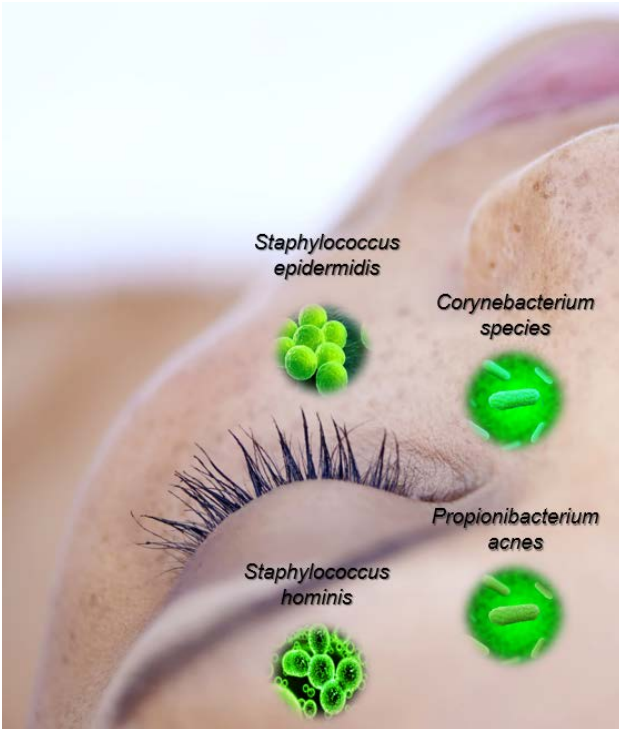
Environmental factors



COMMENSAL BACTERIA

Resident flora that lives in harmony with skin cell

- Staphylococcus epidermidis
- Staphylococcus hominis
- Corynebacterium species
- Propionibacterium acnes



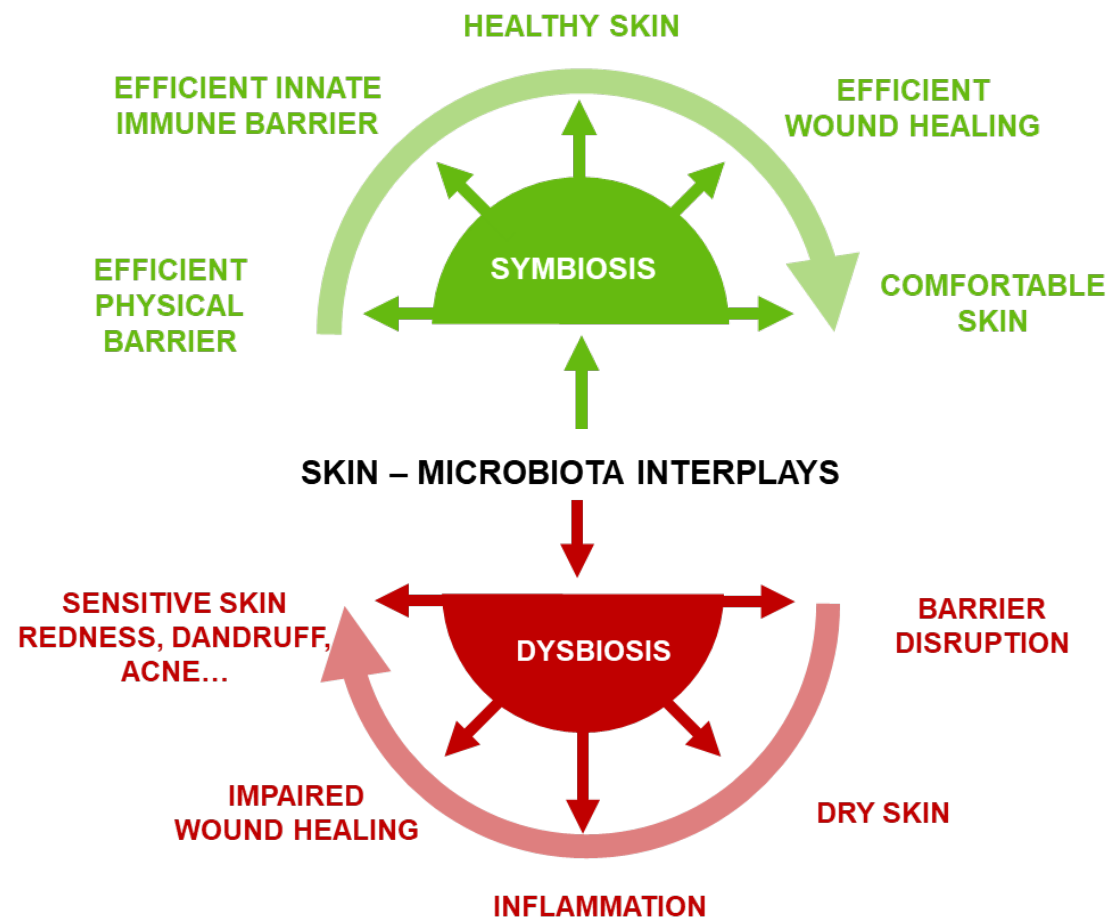
OPPORTUNISTIC PATHOGENS

Present on skin surface, but replace commensal bacteria and evade the immune system and cause inflammation

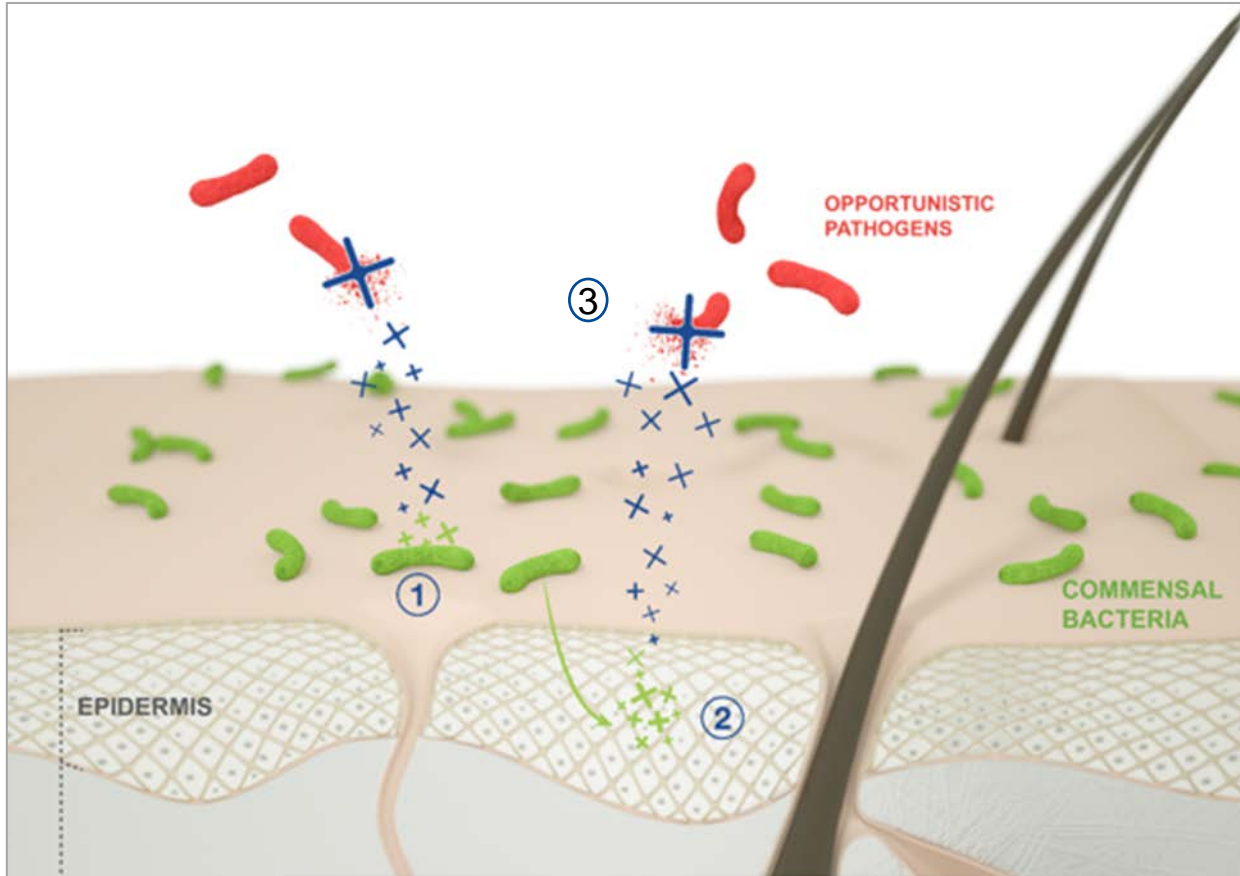
- Staphylococcus aureus
- Pseudomonas aeruginosa
- Propionibacterium acnes



Symbiosis & Dysbiosis



Skin and its microbiota are close partners



1

Protection

Competition between commensals and pathogens
→ *Occupying the ecologic niche*

2

Communication

Direct or indirect communication between the skin and its microflora
→ *Balanced skin awareness - surveillance*

3

Defense

Activation of alert mechanisms, secretion of chemicals
→ *Chemical barrier*

Imbalance of microbiota in skin conditions

Ultraviolet radiation (UVA and UVB)



Gram –ve bacteria
Burkholderiales
increases
2015 SID P582

Sensitive skin and inflammation



Bacillus cereus
increases
PLoS One 2013 Nov 8;8(11):
e78773

Scalp Dandruff



Malassezia furfur
increases

Dry Skin / Atopic dermatitis



Increased microbial burden
particularly *S. aureus*
2015 SID P215, 2015 SID P510, 2015
SID P522

Acne

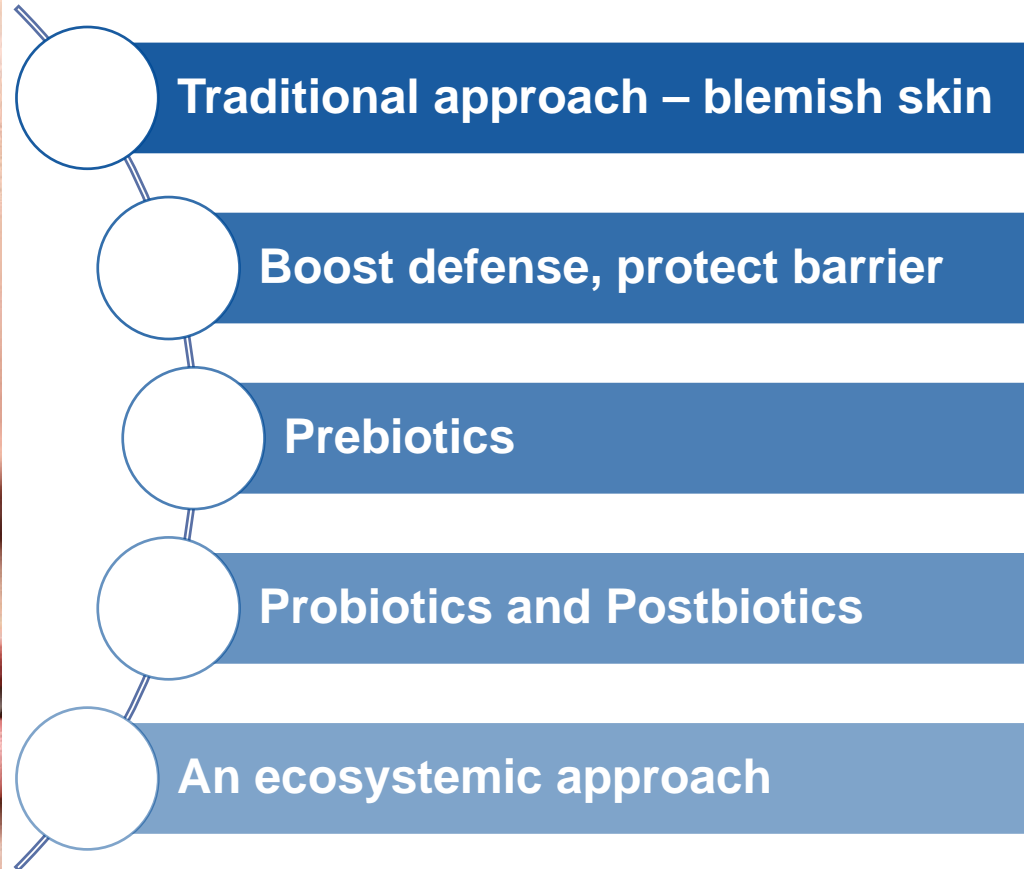


Propionibacterium acnes (now
Cutibacterium) bacterium
implicated in **acne** inflammation
and pathogenesis

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Microbiota & cosmetic skin-care



From an intensive fight to an integrated management

Traditional ingredients for blemish skin concerns



Benzoyl peroxide:

- Antibacterial action against P. acnes
- Removes excess oil and dead skin
- Often used in combination with other molecules



Salicylic acid:

- Clears pores and reduces oil
- Can cause stinging and skin irritation
- Also used in combination with other ingredients

Alpha-hydroxy acids:

- Two types mostly used - glycolic acid and lactic acid
- Removes dead skin
- Reduces appearance of scars



Drawbacks

- Can cause dry skin, scaling, redness, burning and stinging
- May have skin bleaching effect



Source Mintel

Boost defense and protect the skin barrier



- Pollution and external aggressors are key contributors to skin health imbalance.
- Ingredients that bolster the skin and build its defense mechanism and skin barrier helps to balance the skin microbiome
- Ingredients that provide a shield to the skin and prevent binding of external aggressors

Prebiotics

- Food for the good bacteria
- Can selectively stimulate beneficial bacteria
- Improves host health
- Mostly contains oligosaccharides

La Roche-Posay's prebiotic skin care line



Aleavia's use of plant-based prebiotics



Orveda's Prebiotic Emulsion

Probiotics and Postbiotics = probiotics

- Probiotics are the micro-organisms – dead or live
- Postbiotics –
 - Extracts / lysate / filtrate of the beneficial micro-organisms
 - Ferments or broth of the microbial soup



TULA probiotics



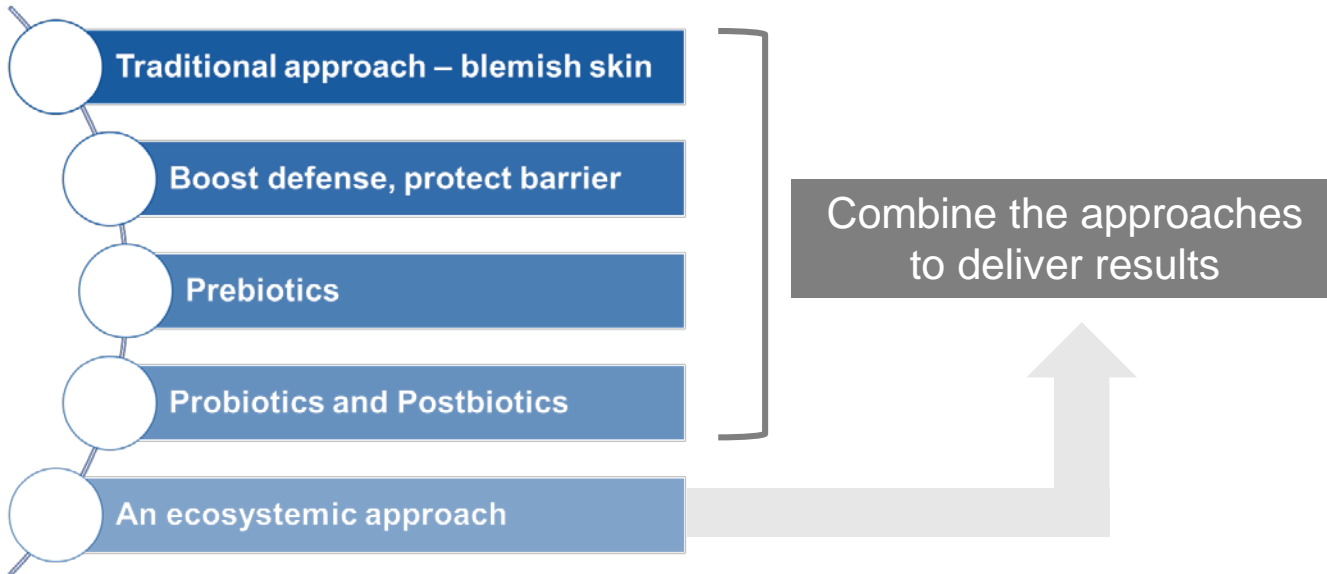
Clinique Redness Solutions Daily Relief Cream With Probiotic Technology



Mother Dirt AO+ / AOBiome



Ecosystem approach – A combination therapy



- Prebiotic - Provide the breeding ground for the beneficial microbes
- Probiotic – Provide the beneficial microbes
- Postbiotic – provide the extract / broth of beneficial microbes

Has an exclusive triple biotic complex based on pre, pro and post-biotics to truly bring skin to life

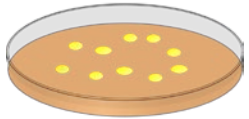


Agenda

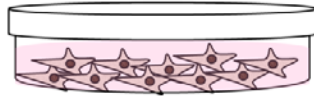
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Study of Microbiota, skin cells, environmental factors in context of human skin

Bacterial cells



Skin cells



Environmental factors

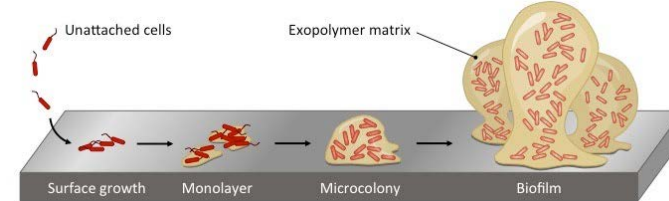
PM 2.5

metals

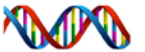
oxidants

Inflammatory agents

Biofilm formation



Clinical studies+ genomics

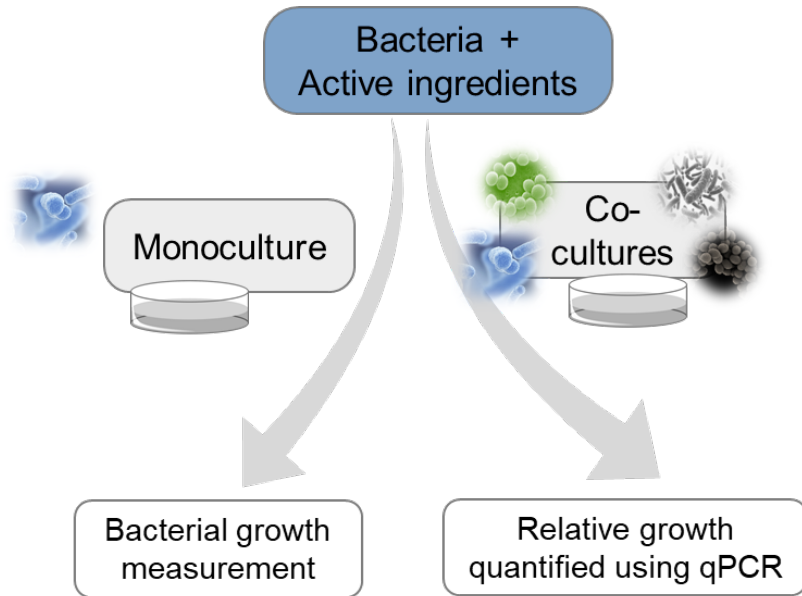


Need for multifaceted models to study the impact of ingredients

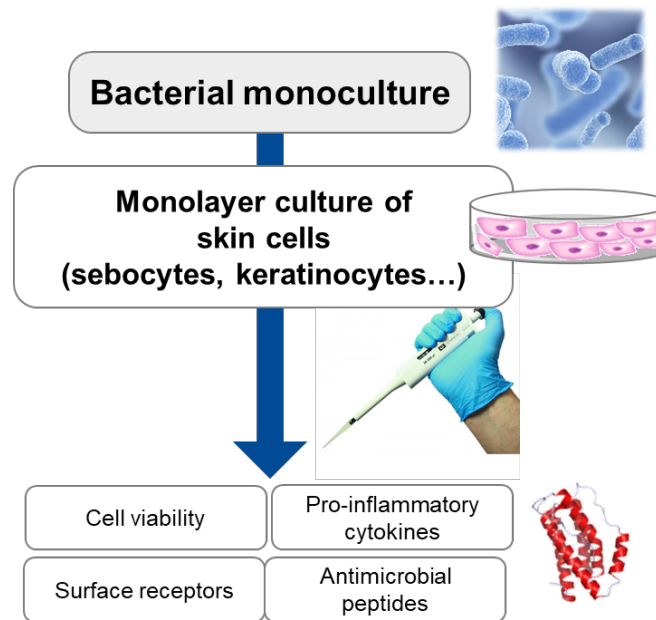
- On microbiota, and skin cells and environmental aggressors such as UV, pollution particles, etc.
- In the context of multiple categories of microorganisms

Models to study microbiota and skin interactions

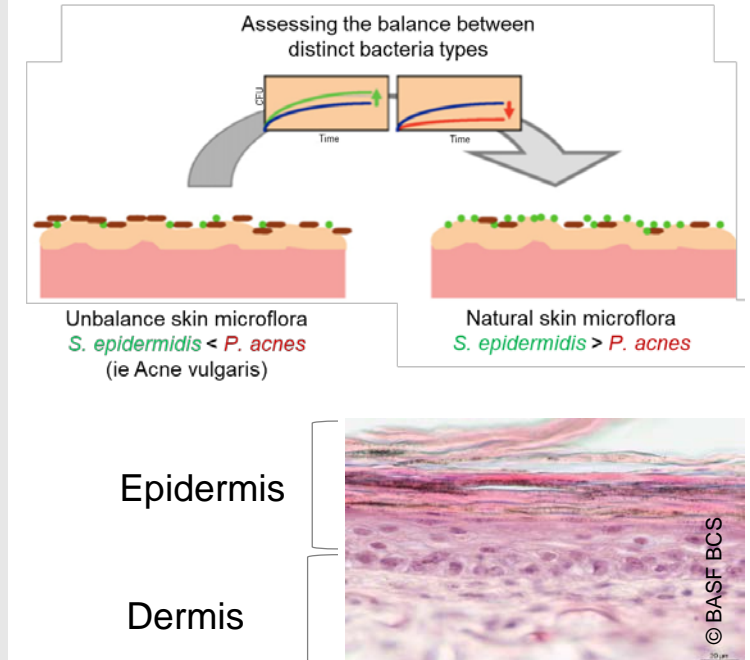
Active ingredient and single or mixed microbial cultures



Single layered Skin cells and single microbial co-cultures



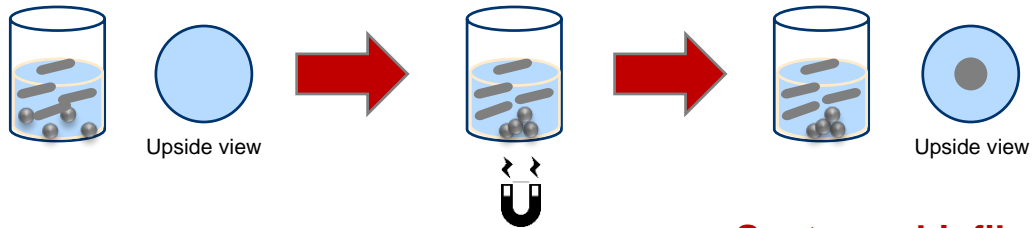
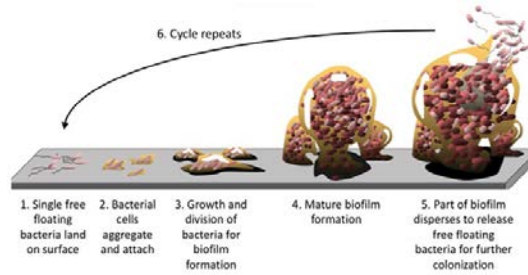
Different types Skin cells and mixed microbes model



Need for complex models to study effect of ingredients on microbiota and its ecosystem

Advanced systems to study microbiota

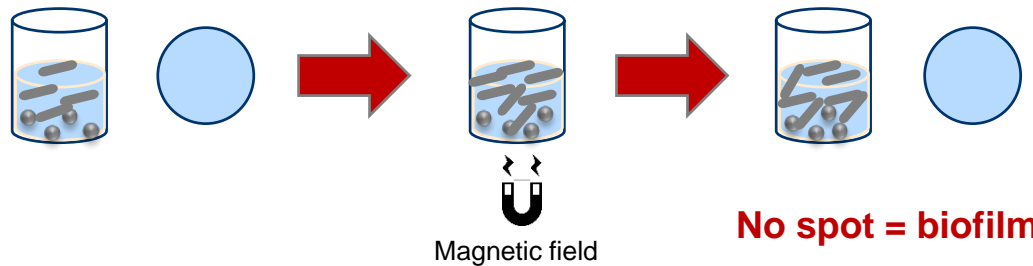
Microbial biofilms



Bacteria
 Paramagnetic microbeads

Spot = no biofilm

Particles move under the action of the magnetic field and aggregate in the center of the well



No spot = biofilm

Fixed particles under action of magnetic field

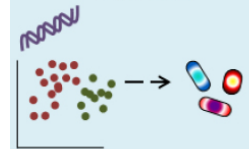
Studies on human panelists



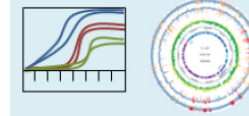
DNA-Based Approaches

Who is there?
What can they do?

16S rRNA, 18S, ITS gene sequencing



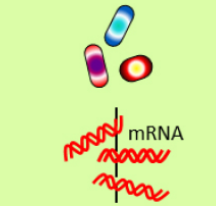
metagenomics



RNA-Based Approaches

How do they respond?
What pathways are activated?

metatranscriptomics

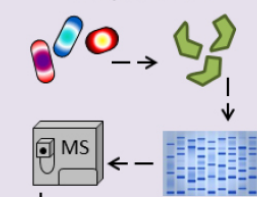


enzymes

Protein-Based Approaches

How are they interacting with the host?
What proteins are being produced?

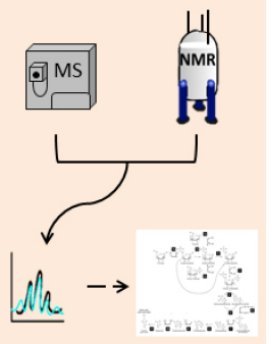
metaproteomics



Metabolite-Based Approaches

What are the chemical outcomes of their activity?

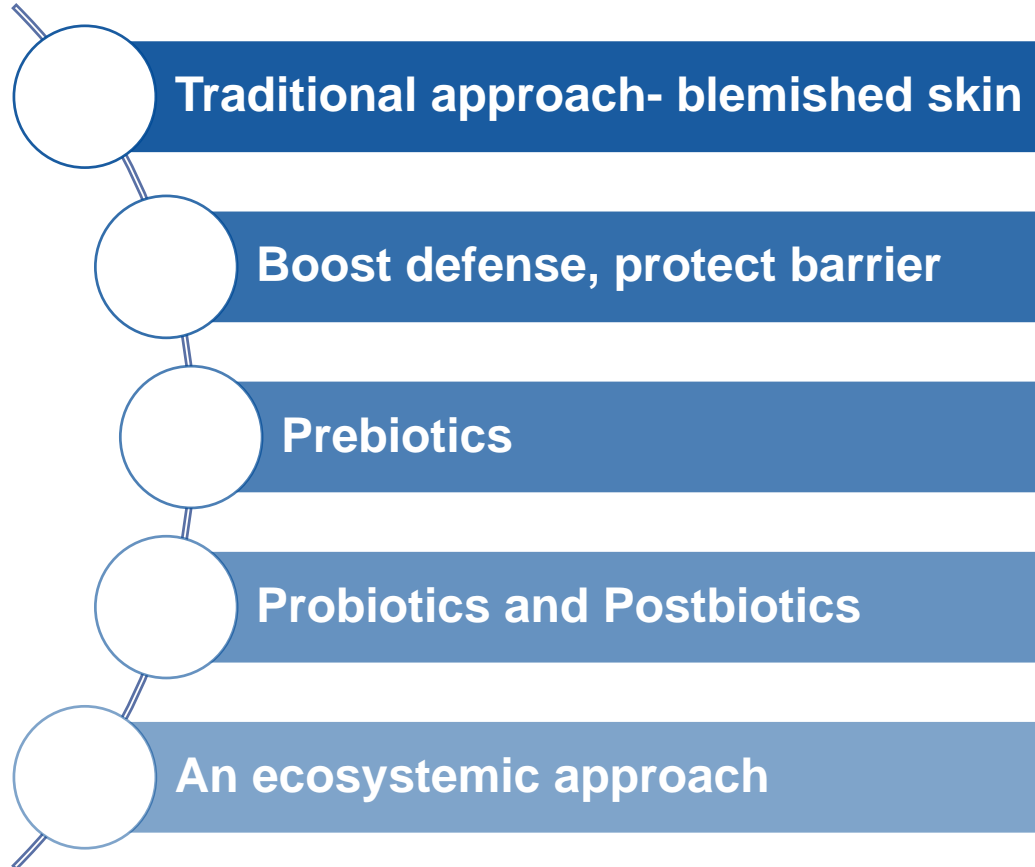
metabolomics



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BASF solutions



Beta-hydroxyde™ ACSD, AH-Care™-G-60, AH-Care™-L65

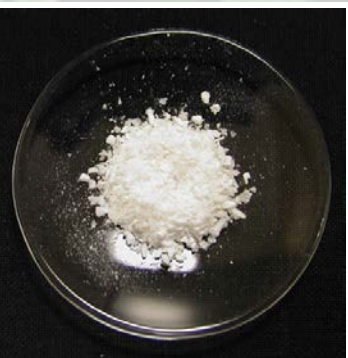
Betapur™, Patch2O™, Purisoft™

Oligolin™

Relipidium™



Beta-Hydroxyde™ ACSD



acacia polysaccharides

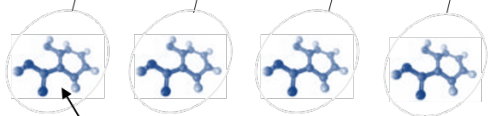


Acacia Senegal Gum



Salicylic Acid

Beta-Hydroxyde™ ACSD



Salicylic acid

Oily Skin Corrector

- Advanced technology - molecular association between salicylic acid and acacia polysaccharides
- When associated to acacia polysaccharides, salicylic acid is slowly released and better targets the top layers of the skin
- This combination also decreases the irritation potential to your skin

INCI : Salicylic acid, senegal acacia gum

Use level: 1-5%



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Beta-Hydroxyde™ ACSD

Summary of Study Results & Perceivable Claims

CLARIFIES SKIN

- 42% Slows down the penetration speed of Salicylic acid and targets the skin's surface

- 47.5% Refines pore size in 14 days

~50% Reduces sebum secretion in 14 days

CONSUMER BENEFITS

90% Found their skin less oily after 4 weeks

80% Notices a pore refinement after 4 weeks

"The effectiveness of salicylic acid can be prolonged." [1]

"As effective as comparable products based on salicylic acid, but much milder." [1]

"Helps to refine pores by up to 30 %." [1]

"Helps to reduce sebum secretion by up to 50 % within 4 weeks." [1]

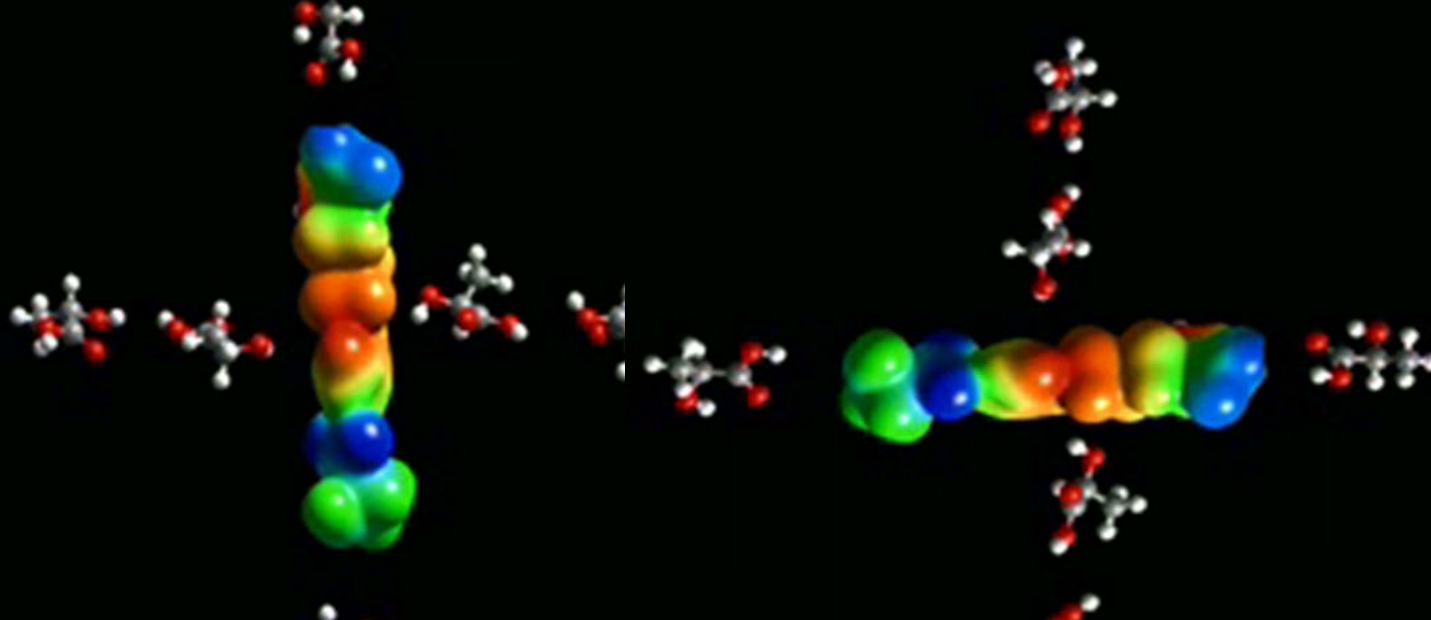
"90 % of volunteers found their skin less oily after 4 weeks." [1]

[1] In vivo results

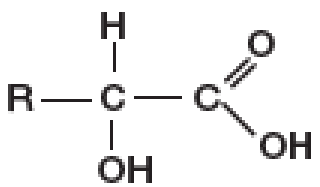
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AH-Care™ G60 / L65



Glycolic Acid: R=H
 Lactic Acid: R= CH3

AH-Care™ G60

AH-Care™ L65

Enhancing AHAs

- **Benefits of Alpha hydroxy acids** - include Exfoliation, Moisturization, Reduction of fine lines and wrinkles, Collagen synthesis, Firming, Skin lightening
- **Drawbacks of Alpha hydroxy acids** - stinging or burning sensation (due to rapid penetration of free acid), especially on sensitive skin.

- **AH-Care™ are Amphoteric Hydroxy Complexes (AHCs)** obtained by mixing AHAs with amphoteric compounds such as amino acids that give the same benefits as AHAs with less irritation

AHCare™ L65 - Lactic Acid (and) Aqua (and) Arginine
 Use level : 3-10%

AHCare™ G60 – Aqua (and) glycolic acid (and) Arginine
 Use level : 2.5%



AH-Care™ L65 and G60

Summary of Study Results & Perceivable Claims

PRODUCT EFFICACY

- **AHCare™ L65 and G60** - significantly less irritating than lactic acid and glycolic acid respectively at the same concentration
- Both increases the cell turnover and renewal rate significantly and as good as respective acids

PRODUCT INFORMATION

- A patented complex of acid and arginine at a specific ratio

"Much milder than a treatment with pure AHA." [1]

Patented complex

"With amino acid complex that contributes to a mild skin renewal." [1]

"Helps the skin to regenerate quicker." [1]

[1] In vivo results

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Betapur™



Peumus Boldus Leaf Extract

Extraction

Betapur™

Purify Skin for Clearer Complexion

- Boldo is a powerful natural extract selected to eliminate the imperfections and diffuse the visible redness on blemished skin
- The skin is the body's first line of defense against opportunistic pathogens
- Bold has the ability to stimulate the skin's natural antimicrobial defense system without triggering any inflammatory reaction

INCI Name: Aqua (and) Butylene Glycol (and) Peumus Boldus Leaf Extract (and) Pentylene Glycol (and) Xanthan Gum

Use level : 0.5 - 5%



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Betapur™

Summary of Study Results & Perceivable Claims

MICROBIOTA OPTIMIZER

50% Decrease in *P.acnes* growth (*in tubo*)
Decrease in *S.aureus* growth (*in tubo*)

STRENGTHENED SKIN DEFENSES

X 8 Stimulates the skin's natural anti-bacterial system
(beta-defensin HBD-3)

SOOTHES THE SKIN

32% Decrease in inflammatory cytokines (IL-8)

CLARIFIES SKIN WITH IMPERFECTIONS AFTER 1 MONTH

80% Homogenous complexion

84% Less visible pores

18% Reduction of color intensity of red blotches

"Contains extract of Chile's Wild Mint leaves." [1]

"Helps to decrease red blotchy patches." [2]

"Positively influences the skin-own self defense against bacteria." [2]

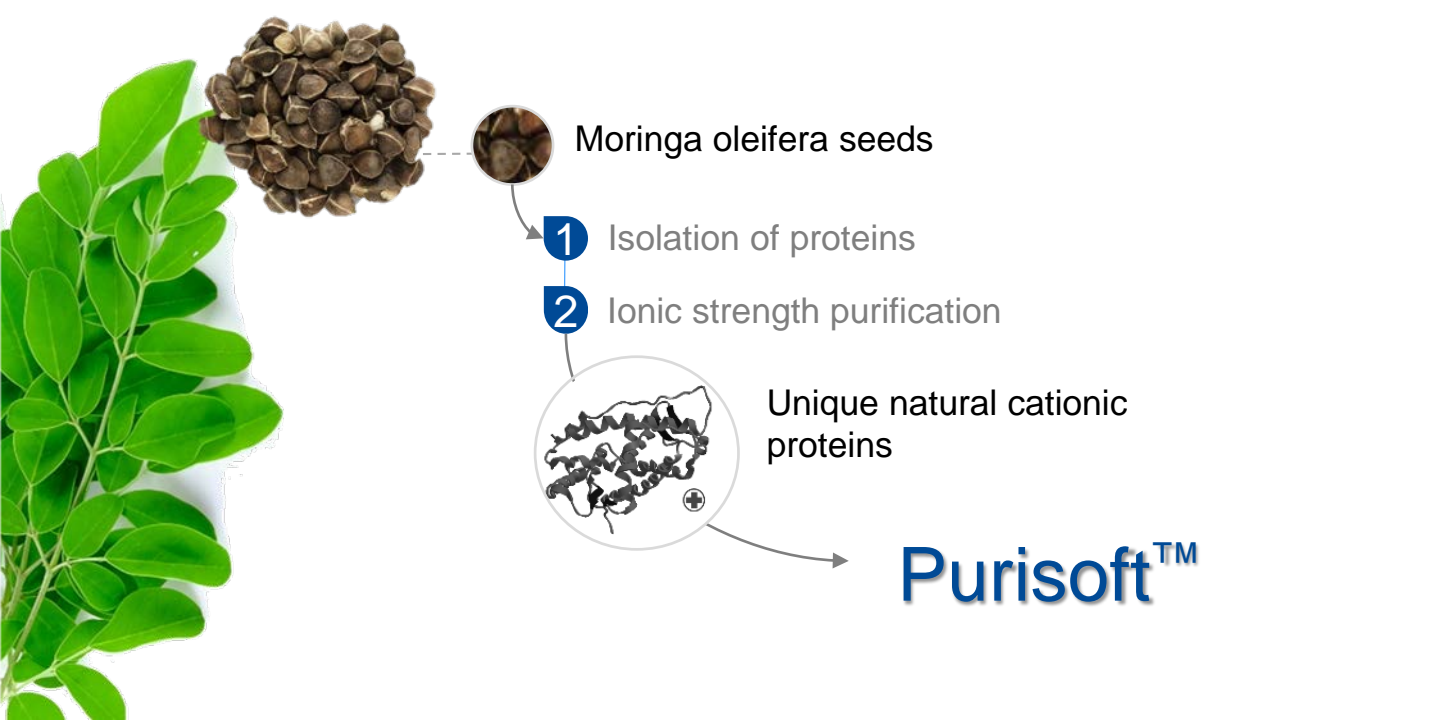
"Improves skin texture, complexion and radiance." [1]

[1] Ingredients / Story [2] In vivo results

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Purisoft™



Harnessing the Superpowers of Moringa

- Crushed *Moringa oleifera* seeds have a unique ability to aggregate and precipitate particulate matter
- Valued for its traditional use as a means of water purification in regions with limited access to usable water
- Enriched with proteins, Purisoft™ delivers anti-pollution benefits to the skin

INCI (Liquid): Water (and) Glycerin (and) Moringa Oleifera Seed Extract

INCI (Powder): Moringa Oleifera Seed Extract (and) Dextrin

Use level : 1.5% (Liquid) & 0.03% (Powder)



Purisoft™

Summary of Study Results & Perceivable Claims

REBALANCES SKIN MICROFLORA

X 2

Protects commensal bacteria against PM2.5
(*S.epidermidis*) (*in tubo*)

X 1.5

Protects commensal bacteria against PM2.5
(*S.hominis*) (*in tubo*)

PURIFY SKIN

X 8

Easier removal of dirt particles

FIGHT INDUCED INFLAMMATION

- 48%

Inflammation caused by PM2.5 & UV

PROTECT AGAINST OXIDATIVE STRESS

- 51%

Intracellular ROS

- 39%

Lipid peroxidation

"Natives use the grinded seeds of the Moringa tree for water purification." [1]

"Supports the resistance of skin cells towards environmental stress." [2]

"With extract of the African 'Miracle Tree' Moringa." [1]

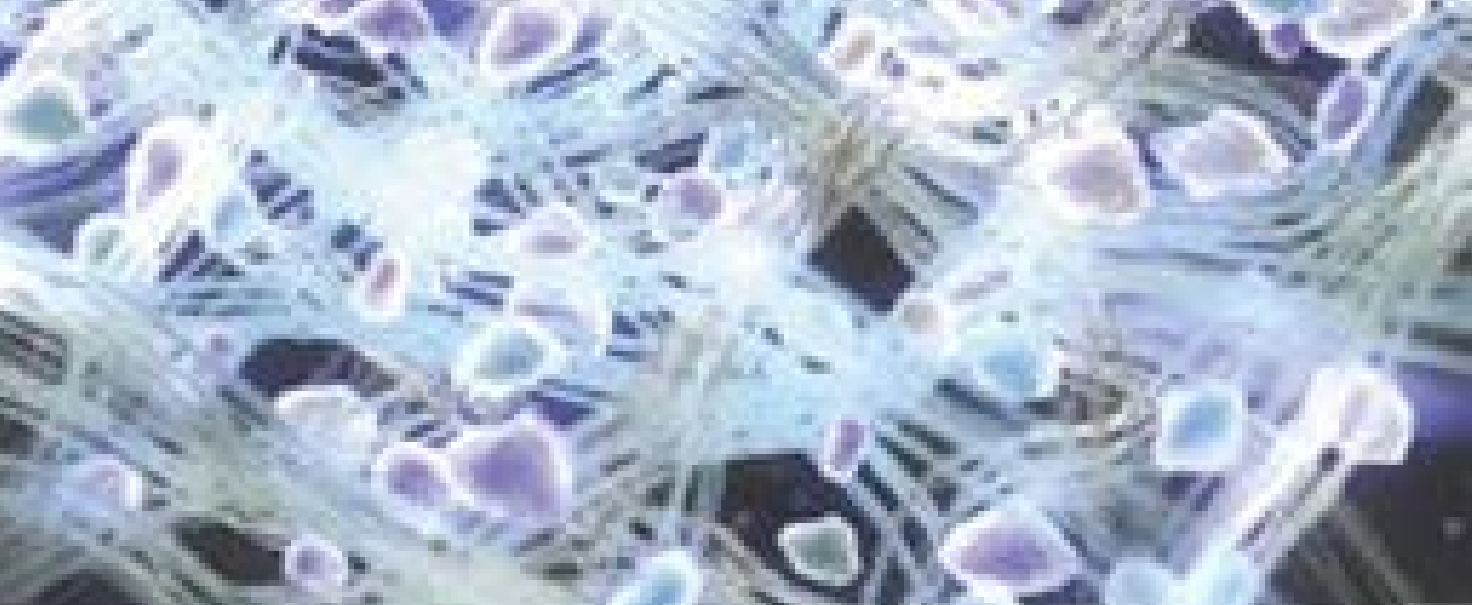
"Can form a protective film on the skin surface, repel dust particles and by that, make the skin cleansing easier." [3]

[1] Ingredients / Story [2] In vitro results [3] In vivo results

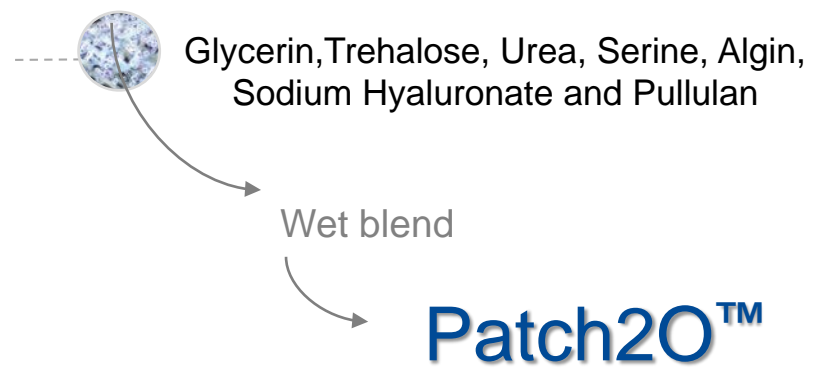
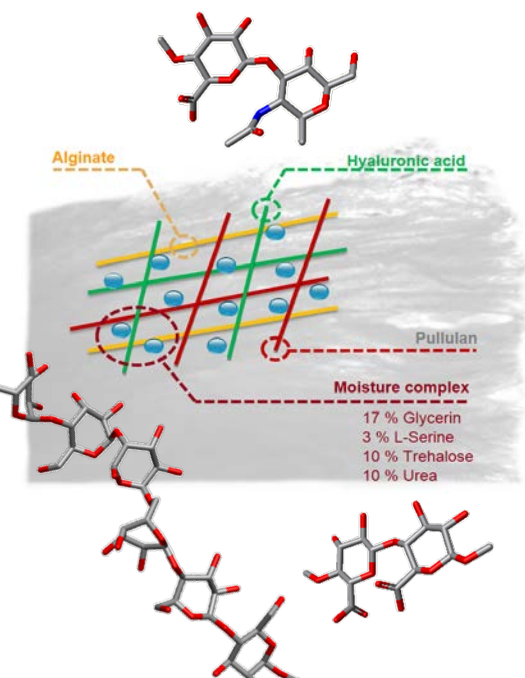
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Patch20™



Hydra-protect Technology

- Patented combination of three bio-polysaccharides
- “Water locked in” system
- Reservoir for sustained release of active ingredients
- Structured network with micro caverns to act like a molecular mesh

INCI (Liquid): Water (and) Glycerin (and) Glyceryl Polyacrylate (and) Trehalose (and) Urea (and) Serine (and) Pentylene Glycol (and) Algin (and) Caprylyl Glycol (and) Sodium Hyaluronate (and) Pullulan (and) Disodium Phosphate (and) Potassium Phosphate

Use level : 3%



Patch20™

Summary of Study Results & Perceivable Claims

OPTIMIZE SKIN MICROFLORA

X 1.5

Preservation of beneficial skin microbiota *S. epidermidis* against pollution PM 2.5 (*in tubo*)

43%

Increased protection from pollution deposition on skin

33%

Reduction of biofilm formation (*S. aureus*) (*in tubo*)

EPIDERMIS HYDRATION

71%

Improvement in hydration vs placebo (*in vivo*)

5 days

Comfort and moisturization after treatment continuation to skin

88%

Hydrated and soft skin

"AquaGuard."
[1]

"Contains 4 of the best humectants in a 3D active ingredient reservoir made of natural raw materials." [1]

"Long-lasting moisturisation, up to 5 days after the last application." [3]

"Provides moisture for 48 hours." [2]

"Helps skin cells to maintain their vitality in presence of chemical pollutants." [3]

[1] Ingredients / Story [2] In vitro results [3] In vivo results

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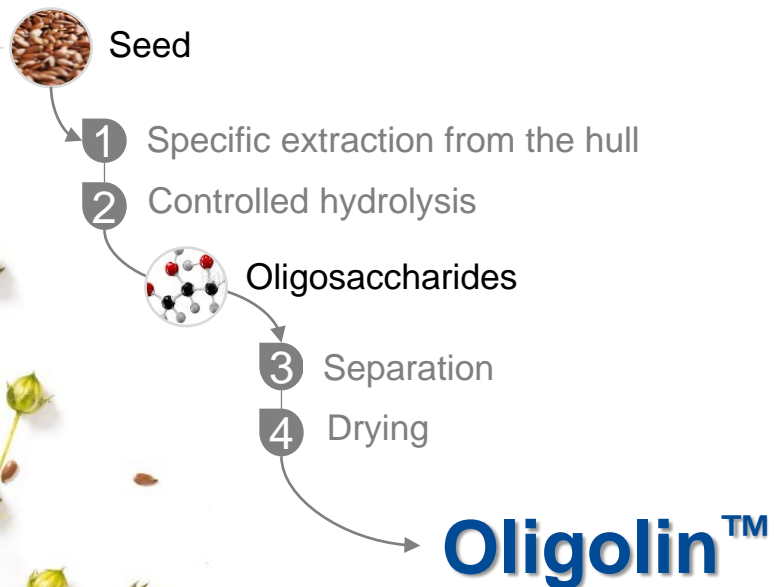
BASF
We create chemistry

Care
Creations™

Prebiotic Flax for Skin Nourishment

- Flax has been a crop cultivated for millennia because of its numerous health benefits
- Obtained via a unique, patented and purification process
- Comprises of high-molecular weight, natural oligosaccharides from flaxseeds
- Highly concentrated, non-preserved powder with versatile firming and moisturizing benefits

Oligolin™



INCI Name: Hydrolyzed Linseed extract

Use level : 1%



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Oligolin™

Summary of Study Results & Perceivable Claims

In vitro

HYDRATION

+43%

THICKNESS



Epidermis
Regeneration

-32%

HYALURONIDASE



Hyaluronic Acid
Protection

SKIN FIRMNESS

+34%

Fibroblasts Proliferation

+56%

COLLAGEN I



Complete
Dermis
Restructuring

+63%

COLLAGEN III

In vivo

Moisturization improved

+11.0 %

after 28
days

Firmness improved

+14.0 %

after 28
days

Prebiotic
power of flax

"Contributes to
a thickening of
the
epidermis." [2]

"May reduce the
degradation of
hyaluronic acid." [2]

"Contributes to
intensive skin
hydration." [3]

"Helps to
improve skin
elasticity." [3]

[1] Ingredients / Story [2] In vitro results [3] In vivo results

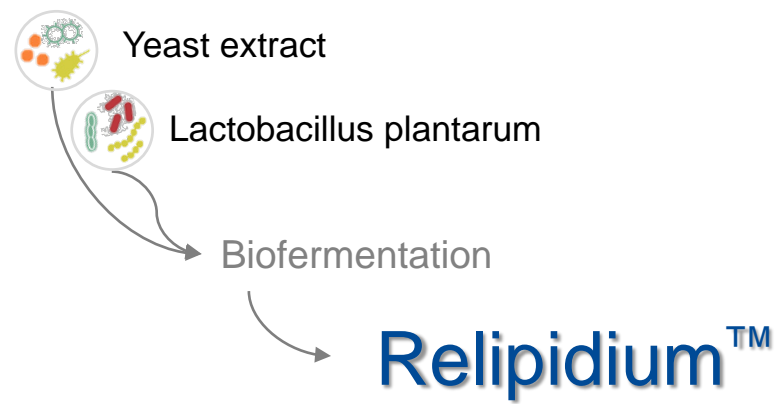
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Relipidium™



From microbiota...



The Micro'beauty Technology

- An impairment of the skin's barrier function disrupts the cutaneous ecosystem and alters its natural microbial biodiversity.
- Our biotechnology experts have selected a specific yeast extract, which is bio-fermented by our exclusive strain of *Lactobacillus plantarum* to create Relipidium™.
- There is a unique peptide and short-chain fatty acid profile of Relipidium™ gives it the ability to restore skin's barrier and rebalance skin disbiosis

INCI Name: Hydrolyzed Yeast Protein, Butylene Glycol, Pentylene Glycol

Use level : 1 - 2%



Relipidium™

Summary of Study Results & Perceivable Claims

BARRIER FUNCTION RECOVERY

+ 94% Ceramides synthesis
+ 20% Barrier recovery

STRENGTHENED SKIN DEFENSES

X 10 Dectin-1a & TLR2 Activation

REBALANCED SKIN MICROFLORA

X 2 Commensal germs *S. epidermidis*
X 2.3 *S. epidermidis* / *S. aureus* ratio

"Supports the lipid balance of very dry skin." [1]

"Strengthens the natural skin barrier." [3]

"Favors the synthesis of lipids that are missing especially in dry skin." [2]

"Visibly improves the appearance of dry skin." [3]

[1] Ingredients / Story [2] In vitro results [3] In vivo results

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Care
Creations™

Multifunctional Bioactives targeting the microbiota of skin

	Traditional approach	Barrier improvement	Boost defense	Pre-biotic	Pro / post-biotic	Anti-pollution	Hydration
Beta-Hydroxyde™ ACSD	●						
AH-Care™ L65	●						
AH-Care™ G60	●						
Betapur™			●				
Purisoft™		●				●	
Patch20™		●				●	●
Oligolin™		●		●			●
Relipidium™		●	●		●		●

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