



Bringing cosmetics to life

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Cosmetic active ingredients and probiotics

- Not essential for the basic preparation of cosmetic products, but for the achievement of **longer-term physiological effects** on skin
- Development often involves **leading-edge research** methods
- **Probiotics** are established and valued ingredients in food industry products
- Probiotics are found to have **beneficial effects**, for example, on the gastrointestinal tract
- Growing consumer awareness of **valuable role of microbiome** (millions of microorganisms on and in human body)



Cosmetic active ingredients and probiotics

- Skin is home to many helpful bacteria important to skin health
- Previously, no probiotic active ingredient containing live bacteria for cosmetic purposes was available
- Identification of human microbiome largely completed by The Human Microbiome Project¹ of US National Institutes of Health
- Knowledge about the role of these microorganisms, especially on skin, is in its infancy



¹ E.g.: Structure, function and diversity of the healthy human microbiome, The Human Microbiome Project Consortium, Nature, volume 486, pages 207–214 (2012)

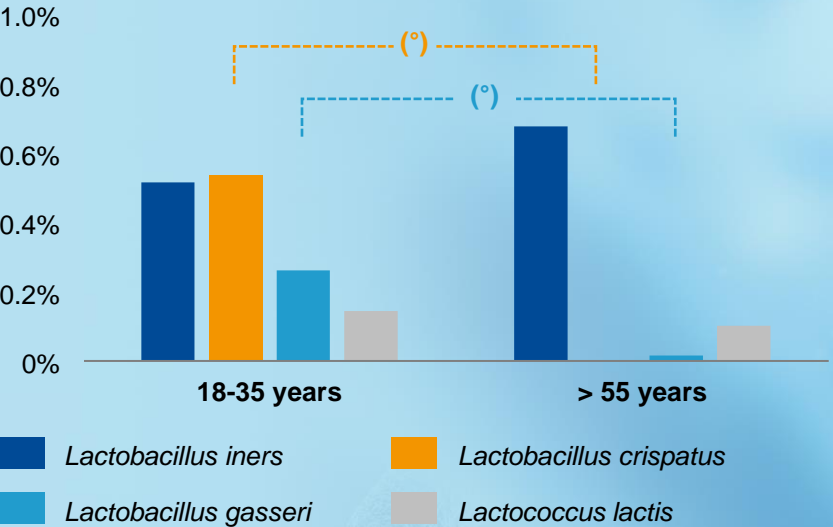
Skin microbiome and aging

- BASF conducted an exploratory study comparing facial skin microbiota of a young cohort with a mature cohort, with a particular focus on the wrinkle zone
- The presence and abundance of microorganisms has been analyzed by whole-genome sequencing and subsequent taxonomic analysis
- These results showed that aged skin is correlated to changes in the microbiome composition, particularly a decrease in prevalence and abundance of *Lactobacillus crispatus* in the wrinkle hollow



Average relative *Lactobacillus* abundance

Percentage of all bacteria in wrinkles/eye contour area



Threshold: 4 most abundant species in young cohort
 Statistics: n = 33 (mature), n = 38 (young), Student t test, (°) p<0.1

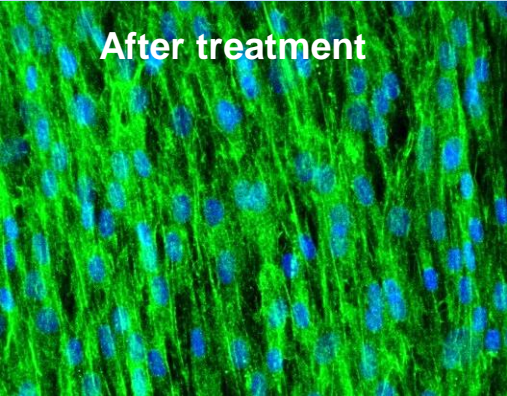
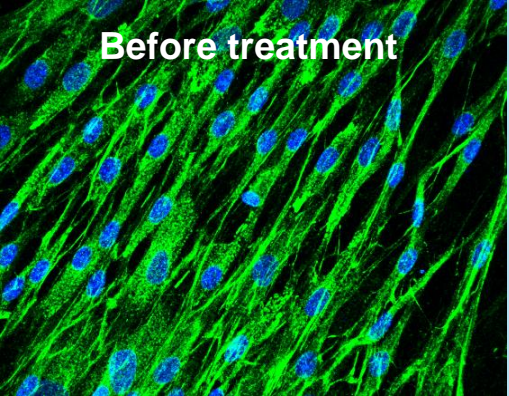
Probiolift® – the first probiotic cosmetic active ingredient

BASF proved that live *Lactobacillus crispatus* bacteria have beneficial effects on skin cells

Live bacteria

Collagen I synthesis stimulation

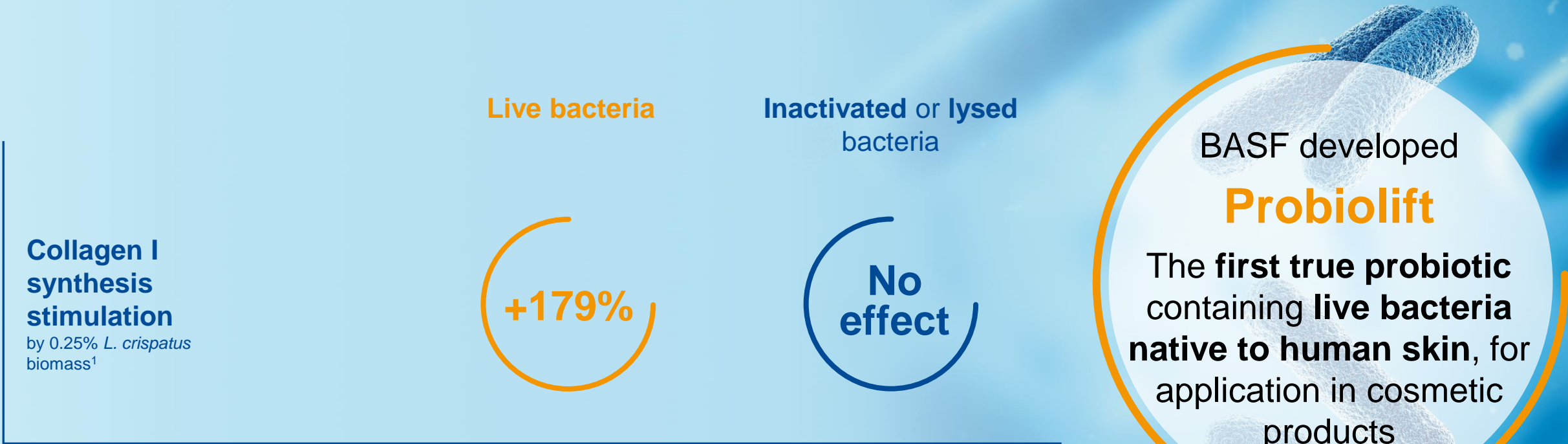
by 0.25% *L. crispatus*
biomass¹



¹ *in vitro* on fibroblasts. Images: fiber visualization by collagen staining. Quantification by ELISA Delfia method vs. untreated.

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Collagen I synthesis stimulation
by 0.25% *L. crispatus* biomass¹

Live bacteria



Inactivated or lysed bacteria



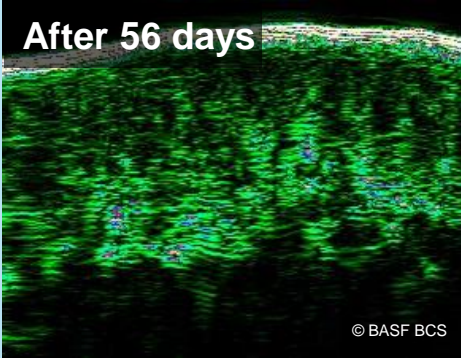
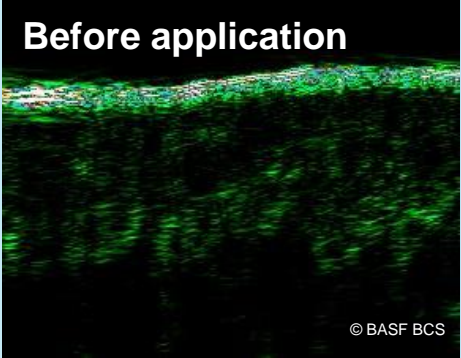
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Probiolift – the first probiotic cosmetic active ingredient

BASF proved that live *Lactobacillus crispatus* bacteria have beneficial effects on skin

Probiolift helps to improve skin's dermal density



Illustrative pictures of the densifying effect on the dermis. Before and after application of a formulation with 0.05% Probiolift

Probiolift helps to reduce forehead wrinkles



Illustrative pictures of the improvement of the forehead wrinkle appearance before and after application of a formulation with 0.05% Probiolift

- very coarse
- coarse
- medium
- fine

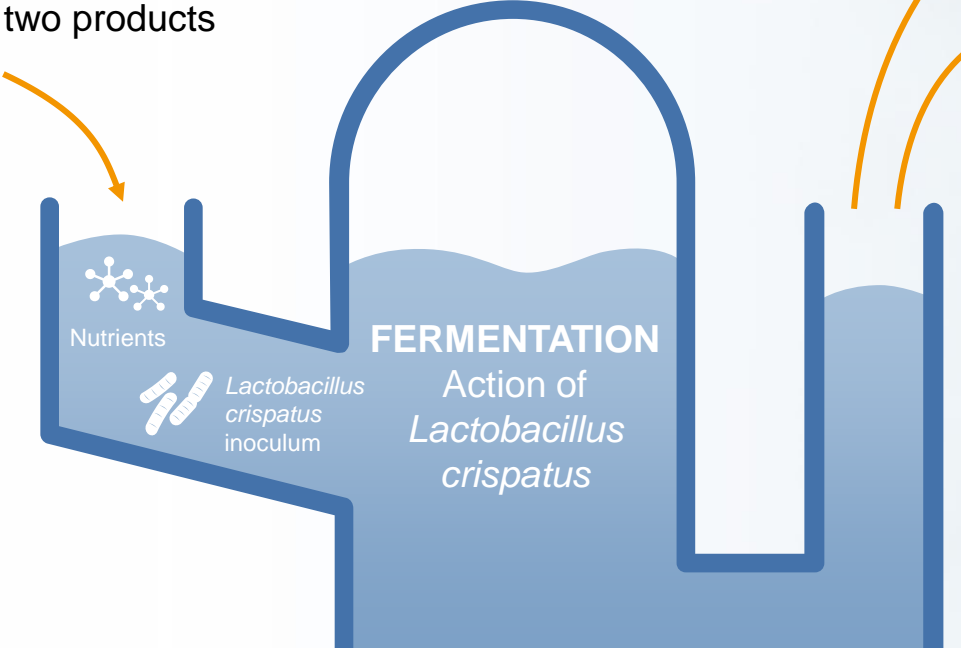


The randomized double-blind study was carried out on 29 healthy Caucasian female volunteers aged 45 to 65 years. Skin density measurement by high frequency and high-resolution diagnostic ultrasound system, allowing non-invasive *in vivo* skin analysis. Wrinkle measurement by VISIA device and Canfield VAESTRO image analysis software.

100% from renewable resources

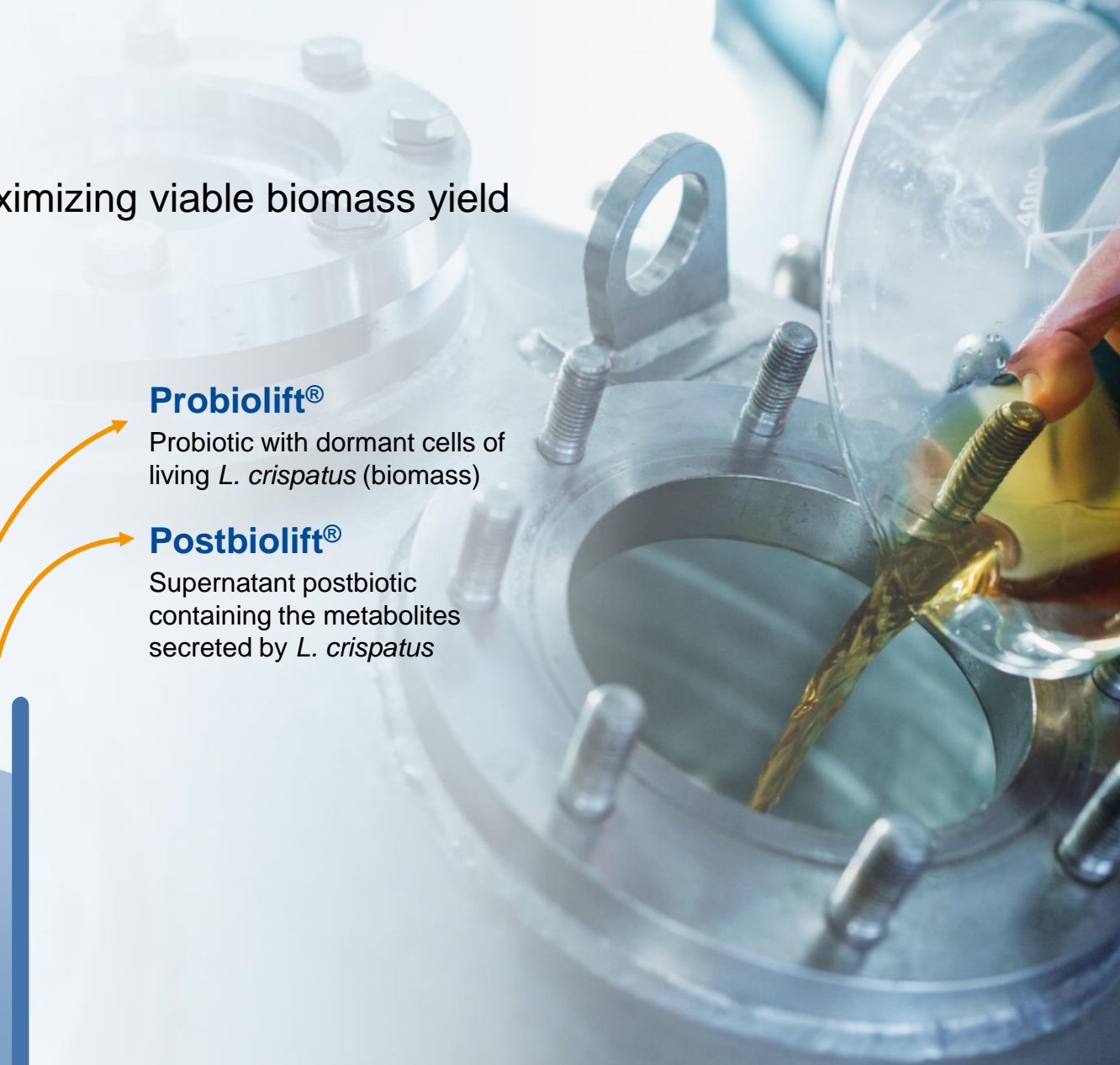
Natural fermentation process minimizing waste and maximizing viable biomass yield

Common input of all process raw materials
The entire resources are consumed during the production of two products



Probiolift®
Probiotic with dormant cells of living *L. crispatus* (biomass)

Postbiolift®
Supernatant postbiotic containing the metabolites secreted by *L. crispatus*



Bringing cosmetics to life

1 The **first true probiotic** containing **live bacteria native to human skin**, specifically developed for cosmetic products

2 First cosmetic probiotic ingredient **based on a beneficial microorganism** that is part of the skin's natural microbiome

3 *Lactobacillus crispatus* is **characteristic of young skin**: It occurs in wrinkles of younger persons, but disappears during aging

4 **Efficacy proven *in vitro*** on skin cells, as well as **in clinical studies**

5 Comprehensive evaluation of toxicology, **compliance with cosmetic regulations** and stability in cosmetic formulations

6 **Sustainable manufacturing** via a natural, biological fermentation process minimizing by-products and waste





We create chemistry