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Yogurt: Using Positive Associations in the Consumer's Mind

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abstract

Consumers prefer clear messages that match prior knowledge and experience – a perfect example is yogurt: Yogurt, as a probiotic food, is a success – it's healthy, it's nutritious, it's tasty. These positive consumer associations are the perfect starting point for developing cosmetic concepts. Lipoid Kosmetik has rediscovered yogurt's beneficial properties for the treatment of sensitive skin and developed a 100% natural, prebiotic, spray-dried yogurt concentrate derived from Swiss milk. As an active ingredient, the yogurt concentrate strengthens the skin's microbial and physical barrier, it calms and soothes sensitive skin.
The power of pre-existing associations was demonstrated in a consumer survey, where yogurt provided an instant sensation of skin refreshment that was triggered by consumer expectations.

Yogurt – a popular food associated with health benefits

What is tasty and has a lot of health benefits? Yogurt! In most grocery stores yogurt has practically taken over the dairy section. In fact, the health benefits of yogurt are impressive, and many health-conscious people make it a daily habit.

Yogurt is made from milk. In a fermentation process, probiotic bacteria convert milk into yoghurt. When eaten, probiotics provide health benefits by supporting digestion and by boosting the function of the immune system [1] [2].

Although yogurt has been part of the human diet for several millennia, the raise of conscious living, healthy nutrition, and active lifestyle has given yogurt's popularity a boost. The interest in probiotics is also fueled by scientific and public interest in the human microbiome – the interacting ecosystems of bacteria and other microorganisms found throughout the body [3]. This trend has now expanded to the cosmetics industry because the microbiome of our skin is as important to our health as is the microbiome of our gastrointestinal system [4].

The interplay between skin microbiome and skin sensitivity

The complex ecosystem of microorganisms that live on our skin is crucial for the way the skin looks, feels, and functions. With approximately one million bacteria per square centimeter of skin, our skin microbiome builds a strong microbial barrier, and plays a vital role in keeping our skin healthy, free from sensitivity and even disease [4].

Fig. 1 Positive associations in the consumer's mind – yogurt is linked to health benefits and an active lifestyle.

Skin hydration and natural sebum production provide nutrients for bacteria – they are important factors for colonization of the human skin by microorganisms. Populated by both, 'good' and 'bad' bacteria, these microbial communities communicate with skin cells to boost immunity and strengthen the skin's physical barrier [5]. This way, a highly populated, balanced, and diversified microbiome builds a strong microbial barrier that actively prevents normal skin from being colonized by opportunistic pathogens.

Many factors can reduce the skin microbiome, from certain skin care products and washing habits, to pollution, UV-radiation, and lifestyle factors such as diet and stress. Once the microbial barrier is weakened, potentially harm-

ful microbes can accumulate and disturb the skin's physical barrier. This in turn favors penetration of environmental aggressors, skin irritation and moisture loss [6]. Dehydrated skin is a poor habitat for bacteria, which further reduces the skin microbiome. Hence, skin sensitivity, dryness, itchiness, irritation, inflammation, and redness are all signs of a potentially weakened microbial barrier **(Figure 2)**.

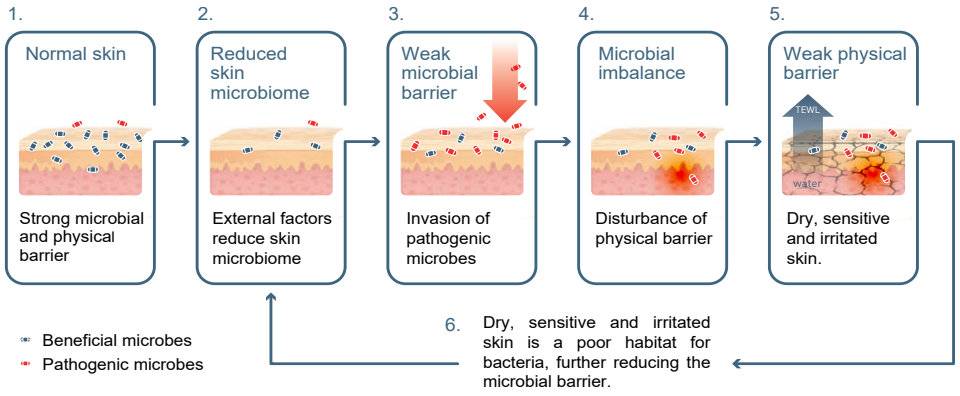

Fig. 2 The interplay between the skin microbiome, physical skin barrier function and skin sensitivity. A reduced microbial barrier disturbs the physical barrier leading to dry and sensitive skin. Dry and sensitive skin further reduces the microbial barrier.

Prebiotic food for the skin microbiome

A strong microbial barrier is a prerequisite for a strong physical barrier. The skin microbiome can be restored with the help of prebiotic skin care products. Prebiotics are naturally occurring nutrients that act like fertilizers – creating an ideal environment for skin microbes.

Yogurt itself is a perfect, ready-to-use prebiotic cream gel – a light formulation, full of vitamins, minerals, and proteins. It is the ideal environment for skin microbes to grow. Yogurtolin® is a spray-dried yogurt concentrate derived from fermented Swiss milk, free of additives and preservatives (hereafter referred to as yogurt concentrate). It is certified as microbiome-friendly, it is COSMOS-approved, and it is of 100% natural origin. Hence it is particularly helpful in recovering a low-level skin microbiome that is typical for sensitive skin.

Yogurt invokes positive associations in cosmetics – a consumer survey

A study was designed to find the most relevant claims for yogurt-based cosmetic concepts. To this end, we analyzed the strength of positive associations linked to yogurt in the consumer's mind. In a survey, 54 volunteers (32 women, 22 men) were asked if they would associate certain attributes to yogurt as a cosmetic ingredient. In total, 25 properties were rated on a scale from 0 to 100 **(Figure 3)**.

As a result, consumers have very clear expectations of yogurt as a cosmetic ingredient: They associate yogurt-based cosmetic products as natural, healthy, microbiome strengthening, calming, gentle and refreshing. Based on these associations, yogurt offers ample opportunities for building cosmetic concepts. In the following, we could substantiate these consumer expectations by several studies.

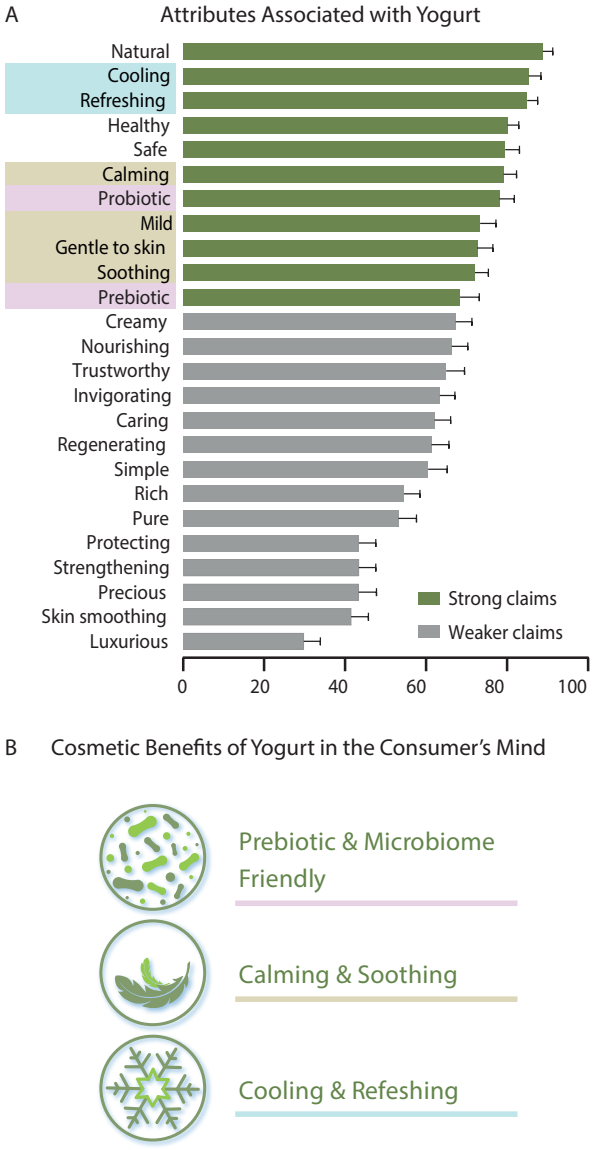

Fig. 3 Yogurt evokes strong pre-existing associations for cosmetic concepts. In a survey, consumers rated their associations with yogurt in cosmetics on a scale from 0 (= no association) to 100 (= strongest association). We consider the top pre-existing consumer association as very useful claims for yogurt-based cosmetic concepts. N = 54, Mean + SEM.

The world's first active ingredient certified as 'microbiome-friendly'

While the number of cosmetic products with microbiome claims is rising, there exist no common standards, nor criteria for microbiome related claims. Many products selectively focus on either microbial balance, diversity, or growth behavior. What's more, consumers know about the importance of the skin microbiome but often lack the scientific knowledge to make purchasing decisions. In summary, communication and substantiation of microbiome-related claims is difficult.

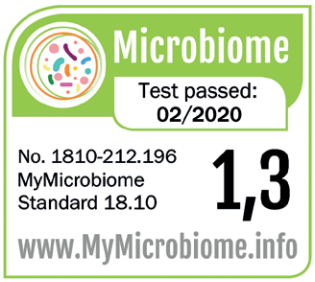

Fig. 4 Yogurt concentrate, a certified microbiome-friendly active ingredient. The quality seal 'microbiome-friendly' uses a conclusive and transparent rating bringing clarity to customers: 1 = Microbiome-friendly; 2 = Microbiome neutral; 3: = Microbiome damaging.

The independent, third-party certification label 'microbiome-friendly' provides a concise and convincing approach to give consumers orientation and to build trust in cosmetic products with microbiome claims. As an independent expert organization, MyMicrobiome issues certificates that make microbiome-related claims transparent and comparable in between products.

The standardized testing procedure covers all aspects of the microbiome, including:

- The microbial quality of the product
- The influence of the product on microbial diversity
- The influence of the product on the growth behavior of specific microbes.

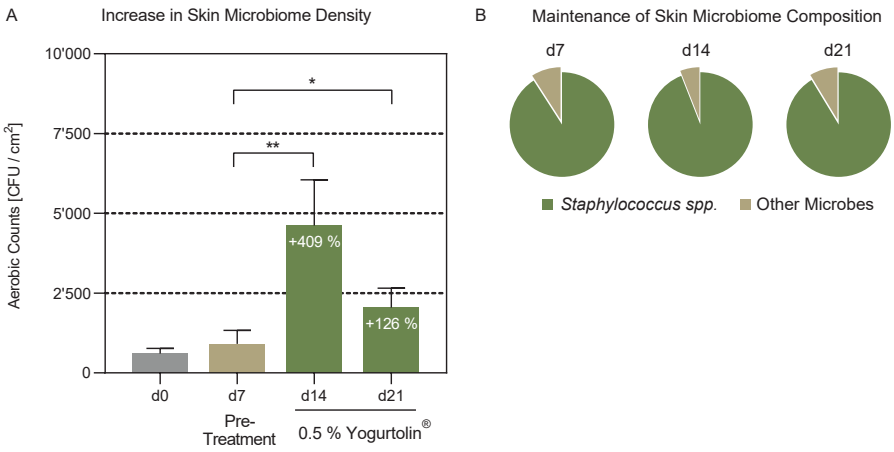

Fig. 5 Yogurt concentrate increases microbe quantity while preserving the microbiome composition. 15 volunteers with dry and sensitive skin and low levels of microbes applied a test formulation with 0.5 % yogurt concentrate twice daily to facial skin. **Fig.5A:** Skin has low levels of microbes before treatment (d0). After pre-treatment, using a formulation without yogurt concentrate, the microbe number slightly raised (d7). Subsequent treatment with yogurt concentrate increased the microbe number (d14, d21). **Fig.5B:** The overall skin microbiome composition was maintained before (d7), during (d14) and after (d21) treatment with yogurt concentrate. No microbial imbalance occurred. N = 15; Mean + SEM; Student's paired test; * = $p < 0.05$; ** = $p < 0.01$.

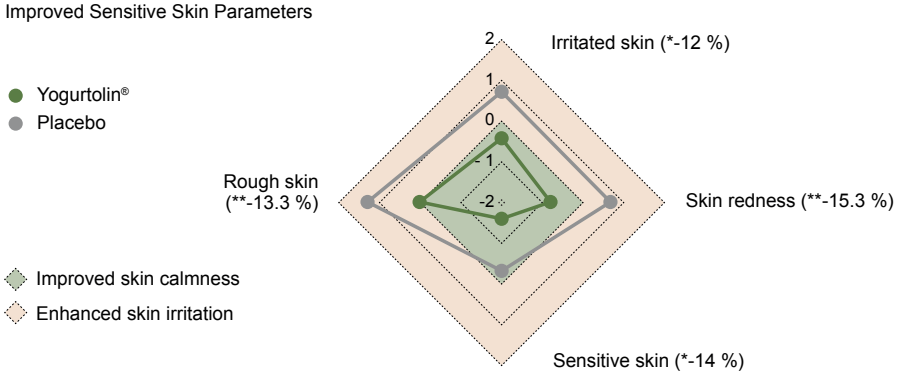

Fig. 6 Consumers experience a relief of sensitive skin with yogurt concentrate. Consumers applied a cream gel with 0.5 % yogurt concentrate or without (placebo) for seven days. They were asked to rate sensitive skin parameters on a 10-degree-scale, before the first and after the last application. The data points show changes in absolute numbers (changes > 0 indicate a worsening, whereas changes < 0 indicate an improvement of the condition). Percentual changes between yogurt cream and placebo at the end of the study are indicated in brackets. N = 15; Mean; Student's unpaired t-test between treatments at d7; * = $p < 0.05$; ** = $p < 0.01$.

Finally, the standard uses a simple and transparent rating that makes products comparable for consumers:

1 = 'microbiome-friendly',
2 = 'microbiome neutral',
3 = 'microbiome damaging'.

(*www.mymicrobiome.info*)

The yogurt concentrate successfully passed the objective test criteria and got certified as 'microbiome-friendly' according to the MyMicrobiome Standard 18.10. Of note, it received an excellent rating of 1.3 = 'microbiome-friendly' **(Figure 4)**.

Re-establishing the skin microbiome – an *in vivo* study

To substantiate the consumer expectation of 'prebiotic and microbiome friendly', we analyzed the impact of a yogurt cream on the quantity and composition of microbes on dry and sensitive facial skin. The total quantity and types of aerobic microbes was monitored by taking swabs from the forehead, followed by a quantification of the total microbe number using cell culture techniques. Microbe types were identified by MALDI-TOF-MS (Matrix Assisted Laser Desorption Ionization - Time of Flight - Mass Spectrometry).

As a result, the yogurt concentrate has prebiotic functionality. It reestablishes and stabilizes a disturbed skin microbiome and thereby helps to strengthen the skin's microbial barrier. This will make skin more robust to external challenges and reduce symptoms of sensitive skin.This finding supports the pre-existing consumer expectation of yogurt being a prebiotic, microbiome-strengthening ingredient.

Calming sensitive and irritated skin – a consumer study

To substantiate the consumer expectation of 'calming and soothing' a placebo-controlled consumer study was performed.

A test panel of two groups of 15 female volunteers with sensitive skin applied a test cream gel formulation with 0.5% yogurt concentrate or without (placebo) to their faces, twice daily for seven days. Volunteers rated skin parameters according to a questionnaire before and after application.

As a result, yogurt concentrate calms and soothes sensitive skin and reduces the redness and irritation level typical for sensitive skin. This finding supports the pre-existing consumer expectations of yogurt being calming and soothing.

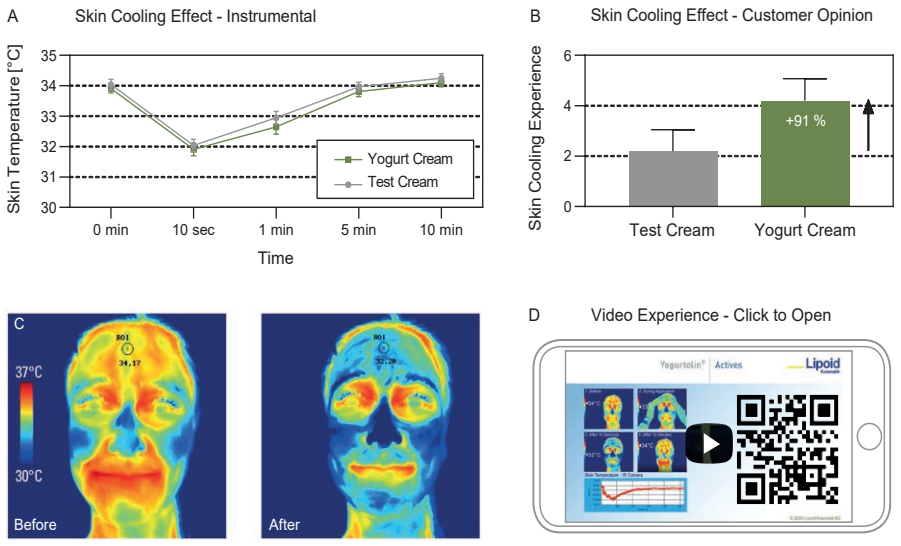

Fig. 7 Subjective sensation of skin cooling with yogurt concentrate. (A) Time course showing that, objectively, both creams reduce skin temperature without a significant difference. N = 15; Mean (B) Subjectively, consumers experienced a 'yogurt cream' to be twice as refreshing than a 'test cream'. Consumers rated their immediate skin cooling experience on a 10-degree-scale (0 = lowest effect; 10 = highest effect) after applying a 'Test Cream' or a 'Yogurt Cream'. (C) Representative infrared thermal images of the skin temperature before and after application of a cream with 0.5% yogurt concentrate. (D) Open the video and experience how a cream with yogurt concentrate can instantly refresh the skin.

Providing a subjective sensation of refreshment

To substantiate the consumer expectation of 'cooling and refreshing' we investigated the instant cooling effect on facial skin after the application of a cream gel with and without yogurt concentrate. To demonstrate real temperature changes on the skin surface, we monitored skin temperature with an infrared thermal camera immediately after application.

To demonstrate the subjective cooling effect associated to yogurt, we asked consumers to rate their cooling experience on a scale from 0 to 10 in a self-evaluation questionnaire. For this experiment, test products were labelled either 'Yogurt Cream' or 'Test Cream'.

As a result, the instrumental assay measured an approx. 2°C drop in skin temperature with no difference between 'Yogurt Cream' or 'Test Cream'. However, the subjectively experienced cooling effect was 91% stronger when the product was labelled "Yogurt Cream". This underlines the principle that "You feel what you expect to feel". Yogurt concentrate supports refreshing cosmetic concepts due to the power of consumer expectations.

Conclusion: Yogurt concentrate is an ideal treatment for sensitive skin

Lipoid Kosmetik has rediscovered yogurt's beneficial properties for sensitive skin and makes use of pre-existing consumer associations linked to yogurt.

- **Prebiotic functionality –** Sensitive skin is characterized by low levels of skin microbiota. Yogurt concentrate is a natural, prebiotic ferment that reinforces the skin's microbial barrier by creating a favorable environment for a balanced skin microbiome.
- **Improvement of sensitive skin –** Sensitive skin is characterized by dryness and irritation. Yogurt concentrate regenerates the physical skin barrier and reduces skin discomfort: it calms and soothes sensitive skin.
- **The power of associations –** The value of yogurt concentrate as a skin care ingredient is not only based on its efficacy, but also on its pre-existing, positive consumer associations (e.g., yogurt is associated with cooling and refreshing properties). These associations add value by reinforcing product experience of yogurt-based cosmetic concepts.

Taken together, Yogurtolin® is a powerful prebiotic and natural concentrate derived from fermented Swiss milk. It builds on pre-existing, positive consumer associations, and allows to create product concepts with clear messages that match prior knowledge and experience. It is best suited for sensitive skin care products that restore the microbial and physical skin barrier and add an instant sensation of skin refreshment and cooling to irritated skin.

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