

Innovative screening and application of *Lactobacillus paracasei* with antioxidant efficacy



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Introduction:

In recent years, probiotic skincare products have been gained extensive attention and application. In order to make up for the shortcomings of the current research methods in probiotic skincare products, we have established an efficacy-oriented strategy for screening and developing strains with specific antioxidant activity. After several rounds of screening, the *Lactobacillus Ferment* (LF) product was successfully obtained, and had a significant effect on reducing oxidative damage. It had been showed that the LF product was safe as a skincare products by the results of the safety evaluation test. And the product has excellent efficacy and can improve the skin condition.

Materials & Methods:

With efficacy-oriented way, the UVB-H₂O₂ dual-model was established for preliminary screening, further 4 rounds of screening and verification were carried out by multiple dimensions. Fortunately, a target strain with strong antioxidant effect, *Lactobacillus paracasei*, was obtained from 85 original probiotic strains, as well, the *Lactobacillus Ferment* (LF) product with better stability was prepared.

And then, the safety of this LF product was evaluated out by cytotoxicity test with keratinocyte (HaCaT) cells - MTT model, ocular irritation test by Chorioallantoic Membrane Vasular Assay (HET-CAM), as well, human patch test was performed on 30 subjects.

In addition, the antioxidant effect of the product was confirmed further by HaCaT-H₂O₂ damage model, T-AOC ability, SOD & CAT activity, ROS value and Nrf2 secretion level were quantitatively detected by fluorescence spectrophotometer or ELISA determination kit method. Finally, the anti-oxidative and anti-aging effects were tested on the face of 30 healthy subjects.

Results & Discussion:

The screening results of fermentation filtrates of 85 strains of probiotics based on UVB-H₂O₂ dual-model screening technology are shown in Figure 1. The fermentation filtrates of 10 strains and their lysates were obtained and further verified. H₂O₂ model screening was used to obtain the fermentation filtrates of 7 strains and their cleavage results, as shown in Figure 2.

The following screening was conducted to obtain the fermentation product with the strongest antioxidant capacity, as shown in Figure 3. Finally, the G4 strain was regarded as the target with best efficacy.

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Results & Discussion:

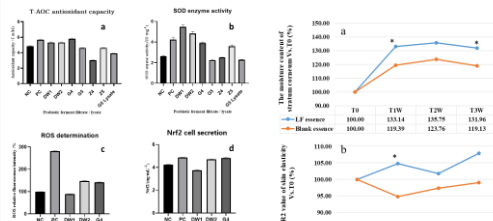
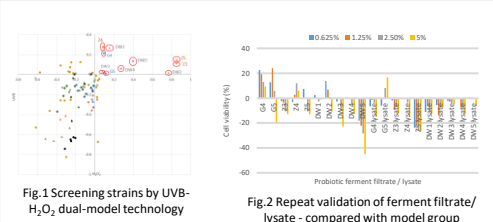


Fig.1 Screening strains by UVB-H₂O₂ dual-model technology
Fig.2 Repeat validation of ferment filtrate/lysate - compared with model group
Fig.3 The verified results on antioxidant efficacy-oriented strategy for screening motivated strain
Fig.6 Effect of LF on the moisture content of stratum corneum (a), skin elasticity (b), area of skin brown spots(c). **, represents the comparison with the blank essence group (p<0.01) *, represents the comparison with the blank essence group (p<0.05)

These results showed that the *Lactobacillus Ferment* (LF) activated the Nrf2 antioxidant pathway, sequentially, enhanced the antioxidant capacity of T-AOC, SOD and CAT, as well, LF played a crucial part in reducing oxidative damage. Furthermore, in-vivo tests have showed that the LF product has been shown to firm and brighten skin by increasing skin hydration and skin elasticity, as well, reducing skin pigmentation.

Conclusions:

It is a new and effective method to develop probiotic skin care products or active ingredients by establishing screening models and obtaining targeted strains and products with specific efficacy.

At present, the *Lactobacillus Ferment* product with specific antioxidant effect obtained by this method has a good application prospect in the field of skincare industry.

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