

# 論文内容要旨

**Dendrobium officinale extract fermented with a plant-derived lactic acid bacterium enhances the protection effect on UV-mediated skin photoaging**

(皮膚光老化予防効果を指標とした  
植物乳酸菌の生薬発酵技術による新たな保健機能性  
の探索研究)

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Plant raw materials contain a variety of active ingredients, which are believed to have anti-aging effects. Fermentation of plant raw materials has been shown to enrich available nutrients and improve the efficacy of raw materials. This has led to increased interest in herbal extracts and probiotics in the scientific community. *Lactobacillus plantarum* isolated from other plants or fruits has been reported in the literature, but the *L. plantarum* isolated from *Dendrobium officinale* has not been reported. This is the first time that *L. plantarum* has been screened from *D. officinale*. In this study, twenty three *L. plantarum* strains were finally obtained as candidate strains by screening the symbiotic bacteria of *D. officinale*. Among them, five *L. plantarum* with high enrichment degree were selected, and the juices of *D. officinale* were used as the research object to explore the kinetic parameters of fermentation of *D. officinale* by *L. plantarum*. At the same time, DPPH, FRAP, ABTS, ORAC and other methods are used, a preliminary screening of *L. plantarum* GT-17F with the best antioxidant effect was obtained.

In this study, the metabolomics analysis of *D. officinale* fermented by *L. plantarum* GT-17F was carried out, and the principal component analysis (PCA) and volcano map multidimensional statistical analysis models were established. Compared with the *D. officinale* control group, 13 up-regulated metabolites and 2 down-regulated metabolites were screened out in the *D. officinale* fermentation group. The amino acids such as acids, lipids, flavonoids and other amino acids of differential metabolites were significantly increased, and the amino acids such as enes were significantly decreased. The key metabolites are mainly 16-ketoestradiol, lucidenic acid K, tolfenamic acid, anisodamine, 5-L-Glutamyl-L-alanine, Madlongiside C.

*In-vitro* experiments showed that *L. plantarum* GT-17F fermentation of *D. officinale* (FDO) had enhanced protection against UV-mediated photoaging. The results showed that the fermented extract of *D. officinale* had a strong antioxidant effect, especially the effect of scavenging free radicals. FDO pretreatment of HSF cells and reconstruction of skin model can inhibit UV-mediated degradation of type I collagen and type III collagen, repair epidermal barrier function, and reduce the damage of barrier related proteins (FLG, LOR). Unfortunately, the material changes in the fermentation of *D. officinale* by *L. plantarum* GT-17F are still unknown.