

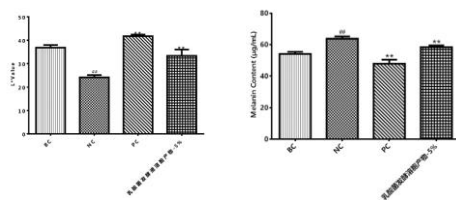
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Introduction:

The color of skin is determined by genes (which determine the physiology, structure and functional difference of the skin), external factors (such as UV) and skin inflammation. Key players that regulate human skin pigmentation include melanocytes in the epidermis that synthesize the melanin and neighboring keratinocytes that receive and distribute it in the upper layers of the skin. Other intrinsic factors that help regulate skin pigmentation include fibroblasts in the dermis that affect overlying melanocytes and keratinocytes, endocrine factors from the blood supply, as well as neural factors and inflammation-related factors. Extrinsic factors that directly and/or indirectly affect skin pigmentation include ultraviolet (UV) radiation. However, the role of fibroblasts on skin pigmentation arouses concern recently. Fibroblasts act on melanocytes directly and indirectly through neighboring cells by secreting a large number of cytokines (SCF), proteins (DKK1, sFRP, Sema7a, CCN, FAP-α) and growth factors (KGF, HGF, bFGF, NT-3, NRG-1, TGF-β) which bind to receptors and modulate intracellular signaling cascades (MAPK/ERK, cAMP/PKA, Wnt/ctenin, PI3K/Akt) related to melanocyte functions. These factors influence the growth, the pigmentation of melanocytes via the expression of melanin-producing enzymes and melanosome transfer, as well as their dendricity, mobility and adhesive properties. Probiotic bacteria are well-established in the food industry, and their benefits for the human body are described in many scientific papers. A product obtained from a lysate of *Lactococcus lactis*, which essentially contains the cell debris of this bacterium – such as cell fragments, like DNA, metabolites, cytoplasmic compounds, and cell wall materials. In this study we found *Lactococcus Ferment Lysate* can induce fibroblasts to produce inflammatory factors IL-17, NF-κB, TNFα. Interleukin (IL)-1, IL-6, and tumor necrosis factor-α (TNFα) are known to suppress skin pigmentation. In evaluate the inhibiting effect of DNA damage: Human keratinocytes were irradiated with UVB(300mJ/cm2). We found *Lactococcus Ferment Lysate* can promote inhibiting UV damage.

Results & Discussion:

Human keratinocytes were irradiated with UVB(300mJ/cm2), related genes were measured using RNA-seq. DNA replication-dependent nucleosome assembly, DNA replication-dependent nucleosome organization, regulation of neutrophil chemotaxis, nuclear nucleosome, nucleosome, DNA packaging complex, cytokine activity. Related genes were significantly up regulated, cellular response to glucose starvation and PERK-mediated unfolded protein response. Related genes were significantly down regulated. IL-17 signaling pathway, Viral protein interaction with cytokine and cytokine receptor, NF-kappa B signaling pathway, TNF signaling pathway. Related genes were significantly up regulated. 5% *Lactococcus Ferment Lysate*, It can obviously improve the L* value, inhibition the Melanin.



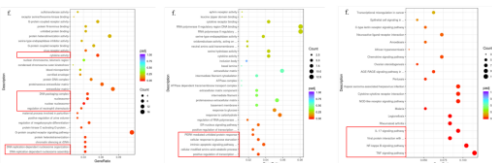
Histogram of L* value test results Histogram of melanin content test results

These results demonstrate that *Lactococcus Ferment Lysate* could be an effective ingredient for cosmetics that exerts a wide variety of biological activities used for skin whitening. It can inhibit the DNA damage and cell apoptosis caused by UV, fight against inflammation and enhance cellular immune function, reduce skin pigmentation after the inflammation, reduce the content and distribution of melanin, lighten skin.

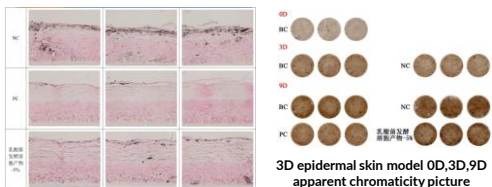
Materials & Methods:

Materials and Methods

Human keratinocytes were irradiated with UVB(300mJ/cm2), related genes were measured using RNA-seq. Human Fibroblast related genes were measured using RNA-seq. Evaluate the inhibiting effect of DNA damage. Evaluate the inhibiting effect of cell apoptosis. Evaluate the inhibiting and activation effect of inflammation.



Evaluate the acceleration effect of skin whitening after UVB: 3D epidermal skin model was irradiated with UVB(50mJ/cm2) for 3 days, the melanin model was photographed, L* was measured with chromatic meter, content of melanin was measured, blackness distribution was detected after section staining.



Conclusions:

Lactococcus Ferment Lysate can induce fibroblasts to produce inflammatory factors IL-17, NF-κB, TNFα. In evaluate the inhibiting effect of DNA damage: Human keratinocytes were irradiated with UVB(300mJ/cm2). We found *Lactococcus Ferment Lysate* can promote cytokine activity, inhibition cellular response to glucose starvation, PERK-mediated unfolded protein response inhibiting UV damage. 3D epidermal skin model was irradiated with UVB(50mJ/cm2) for 3 days, 5% *Lactococcus Ferment Lysate* can obviously improve the L* value, inhibition the Melanin, protect DNA from UV damage, lighten skin.

Acknowledgements:

None.

References:

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