Portulaca oleracea extract can repair skin barrier damage caused by increased photosensitivity after AHA peeling

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Introduction:

Alpha hydroxy acid (AHA) peeling has been a popular project of medical cosmetology, but clinical studies have shown that the symptoms of increased photosensitivity after AHA peeling can hinder the application and development of it. The photosensitivity is due to the effect of AHA aggravating the damage of UVB to the skin barrier. Damaged skin barrier is related to the down regulation of filaggrin (FLG) expression and the increased activity of kallikrein 7 (KLK7). In addition disruption of skin barrier is one of the results of increased inflammatory cytokines, including IL-1β, IL-6, IL-8 and tumor necrosis factor-α (TNF-α) . We aimed to know the probability of photosensitivity and find active substances that can repair skin barrier caused by the increased photosensitivity through experiments at the cellular level.

Materials & Methods:

Information of the surveyed population

100 outpatients were collected who have received AHAs peeling treatment in Peking Union Medical College Hospital within 3 months. Inclusion criteria: having no damaged skin wounds; ability to complete the questionnaire independently and willingly; signing informed consent. Exclusion criteria: taking drugs or receiving other skin resurfacing treatments within three months before; unwilling to be investigated; having communication difficulties; being allergic to fruit acid; having photosensitivity symptoms before receiving AHAs peeling.

Questionnaire survey method

The questionnaire adopts a self-evaluation type. The investigator distributed the questionnaire to the subjects, and the investigator gave a detailed explanation about the questionnaire to the subjects. Subjects completed the questionnaire based on subjective judgment. The type of acid used and the length of time can be asked to the physician.

Cell culture and cytotoxicity analysis

HaCaT cells were maintained in DMEM supplemented with 10% fetal bovine serum (FBS) and 1% penicillin/streptomycin at 37℃ in a humidified atmosphere of 5% CO_2. The toxicity of UVB, GA and P.oleracea extract to HaCaT cells was determined using the CCK-8 kit according to the instruction.

The effect of *P.oleracea extract* on skin barrier repair in photosensitive model

The HaCaT cells in logarithmic growth phase were inoculated in a 6-well plate at a density of 1×10^5 cells/mL, with 2 mL per well. Divided into blank group, model group and experimental group. Cultivated with DMEM to 80% confluence, removed the medium, rinsed carefully with PBS twice, added DMEM (FBS free) containing 0.1% GA to the model group and experimental group, and used DMEM without GA for the blank group as a control, continue to incubated for 24h. Removed the culture medium, rinsed carefully with PBS twice, add 1 mL PBS, and exposed the cells of the model group and the experimental group to 75mJ/cm^2 of UVB. The PBS was removed, the PBS of experimental group was replaced with DMEM containing samples, and the blank group and model group DMEM, and the culture was continued for 24 hours. The cell supernatant and cell lysis supernatant were collected, the concentration of KLK7, IL-8, IL-1β in the cell supernatant and FLG in cell lysis supernatant were detected using ELISA kits according to the instructions. The BCA protein detection kit was used to detect protein content.

Results & Discussion:

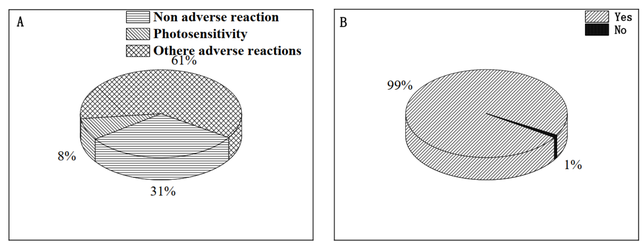

Figure 1 Questionnaire results of AHAs peeling (A, Probability of adverse reactions; B, The necessity of postoperative care for photosensitivity)

69% of people experience side effects after receiving AHA peeling, including immediate flushing, burning, pain, and the follow-up reactions such as erythema, acne, dryness and tanning. And it is worth noting that 12% of people experiencing side effects increase sensitivity of skin to sun light. Skin treated with AHAs will be dry, redness and tingling after sun exposure. 99% of people think it is necessary to take postoperative care measures for the problem of increased photosensitivity, but only 11% take actions.

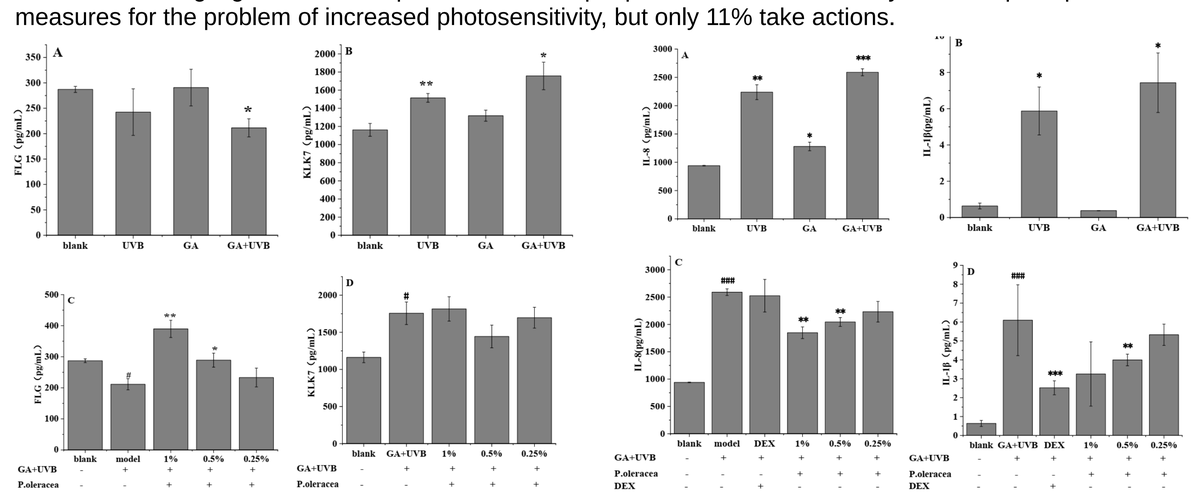

Figure 2 The effect of *P.oleracea* on FLG and KLK7 expression caused by co-stimulation

Figure 3 The effect of *P.oleracea* on IL-8 and IL-1β expression caused co-stimulation

As shown in the figure2 and 3, our experiments at the cellular level have found that compared with UVB or GA , co-stimulation can cause more stronger response of FLG, KLK7, IL-8 and IL-1β expression in HaCaT cells. It implies that co-stimulation will cause more damage to skin barrier and stronger inflammation.

P.oleracea extract can inhibit the expression of KLK7 and the reduction of FLG in HaCaT cells caused by co-stimulation. As while *P.oleracea extract* can significantly inhibit expression of IL-8 and IL-1β in a dose-dependent manner induced by GA+UVB.

Conclusions:

Photosensitivity will increase after AHA peeling, which is also one of the concerns of people. We have also proved at the cellular level that GA+UVB will cause more damage to skin barrier and stronger inflammation. Aiming at the problem of increased photosensitivity after AHA peeling, we believe that *Portulaca oleracea* extract has great application potential in postoperative care.

Aknowledgments:

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References:

Scott, E.J.V. and R.J. Yu, *Control of keratinization with alpha-hydroxy acids and related compounds. I. Topical treatment of ichthyotic disorders.* Archives Of Dermatology, 1974. **110**: p. 586-590.

Scott, E.J.V. and R.J. Yu, *Hyper-kelatinization, corneocyte cohesion and alpha-hydroxy acids.* Journal of the American Academy of Dermatology, 1984. **11**(5Part1): p. 867-879.

Kaidbey, K.a., et al., *Topical glycolic acid enhances photodamage by ultraviolet light.* Photodermatology Photoimmunology and Photomedicine, 2003. **19**(1): p. 21-27.

MD, N.V.P. and J.C.D. MS, *Photoprotective and Antiinflammatory Effects of Topical Glycolic Acid.* Dermatologic Surgery, 1996. **22**(5): p. 435-437.

Lai, W.W., et al., *Synergistic phototoxic effects of glycolic acid in a human keratinocyte cell line (HaCaT).* J Dermatol Sci, 2011. **64**(3): p. 191-8.

Tang, S.C., et al., *Topical application of glycolic acid suppresses the UVB induced IL-6, IL-8, MCP-1 and COX-2 inflammation by modulating NF-kappaB signaling pathway in keratinocytes and mice skin.* J Dermatol Sci, 2017. **86**(3): p. 238-248.