

# Effect of Lactobacillus/Phaseolus Coccineus Seed Extract Ferment Filtrate on dry skin.

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## Introduction:

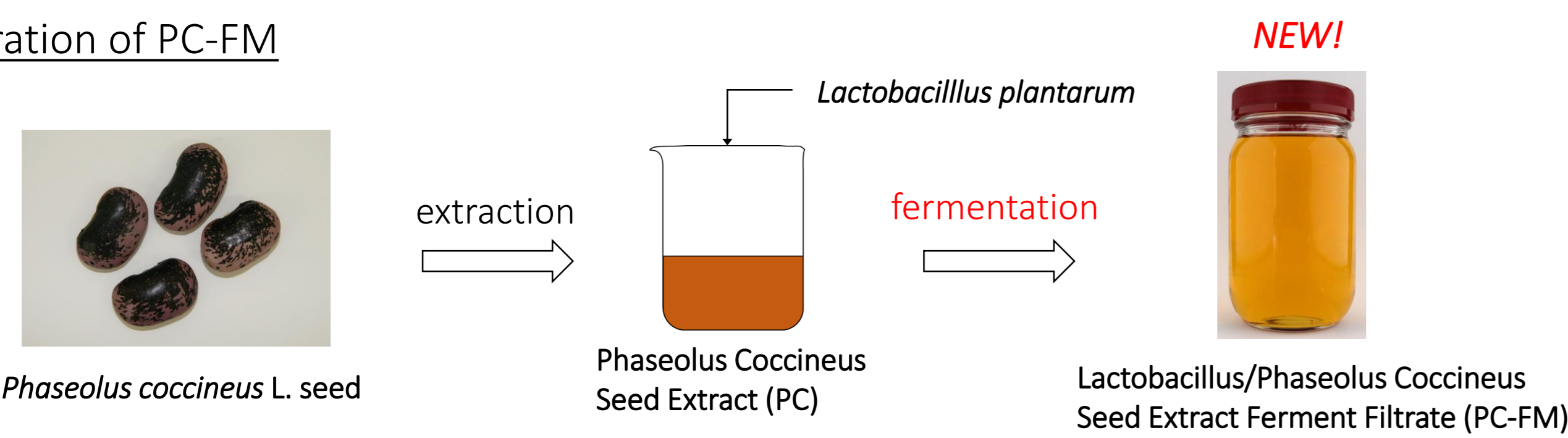
Dry skin is a skin condition which the water contents in stratum corneum (SC) is reduced. Ultraviolet rays (UV) exposure is cited as one of the causes of dry skin. When the skin is damaged by UV, the skin barrier is broken and moisture level is degraded to cause dry skin. The skin barrier which works better contributes to the UV protection and maintenance of homeostasis in the skin. Cornified Envelope (CE) which plays a key role in barrier function, is composed of protein such as involucrin and loricrin (LOR), and transglutaminase-1 (TGM1) crosslinks them to form a strong barrier function. In addition, natural moisturizing factor (NMF) which is involved in water retention in SC, is the final products of filaggrin (FLG) degradation by caspase-14 (CASP14).

Runner bean (*Phaseolus coccineus* L.) seed was reported that contains various polyphenols such as isoflavones and anthocyanins. In previous study, it was shown that Phaseolus coccineus Seed Extract (PC) developed as a material for cosmetics, promotes collagen production in fibroblasts<sup>[1]</sup>. To enhance the efficacy, Lactobacillus/Phaseolus Coccineus Seed Extract Ferment Filtrate (PC-FM) was developed by fermenting PC with lactic acid bacteria. Although it was confirmed that PC-FM has anti-aging effects in fibroblasts<sup>[2]</sup>, the effect in keratinocytes has not been clarified yet.

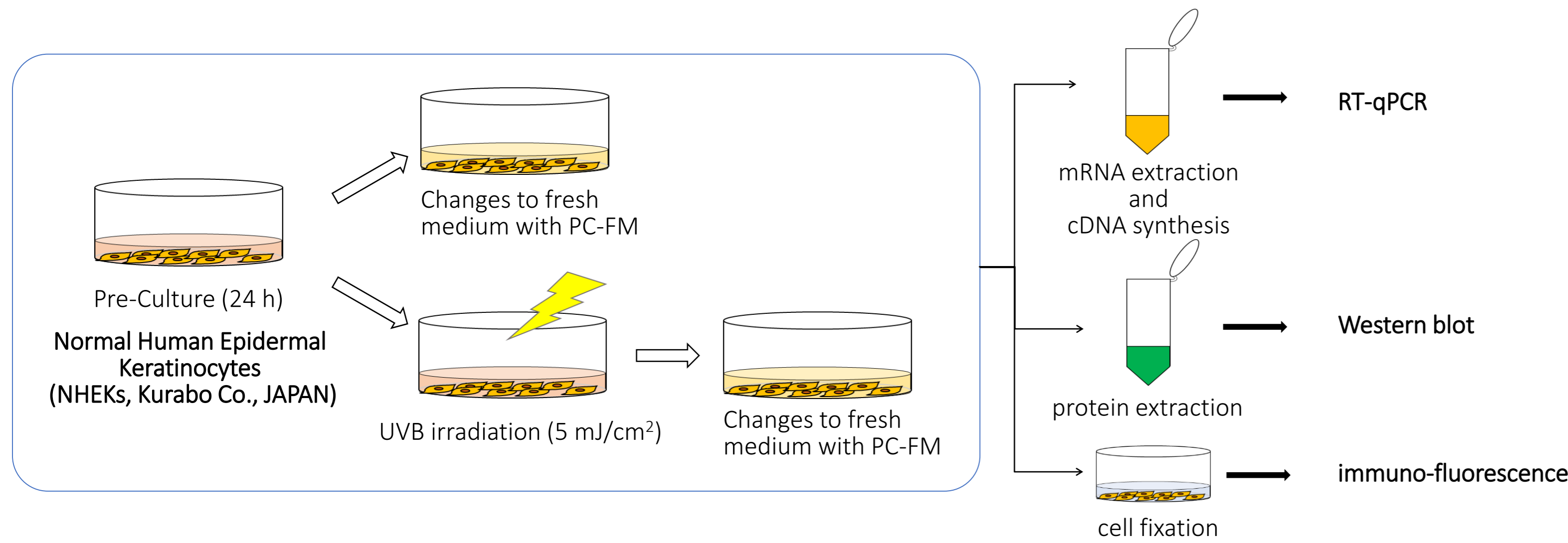
In this study, we evaluated the effect of PC-FM on the mRNA and protein expression involved in skin barrier and water retention in normal human epidermal keratinocyte (NHEK) cells and reconstructed human skin epidermal keratinization (RHEK) models. Furthermore, we investigated whether PC-FM suppress the decrease of mRNA and protein expression in NHEKs by UVB irradiation.

## Materials & Methods:

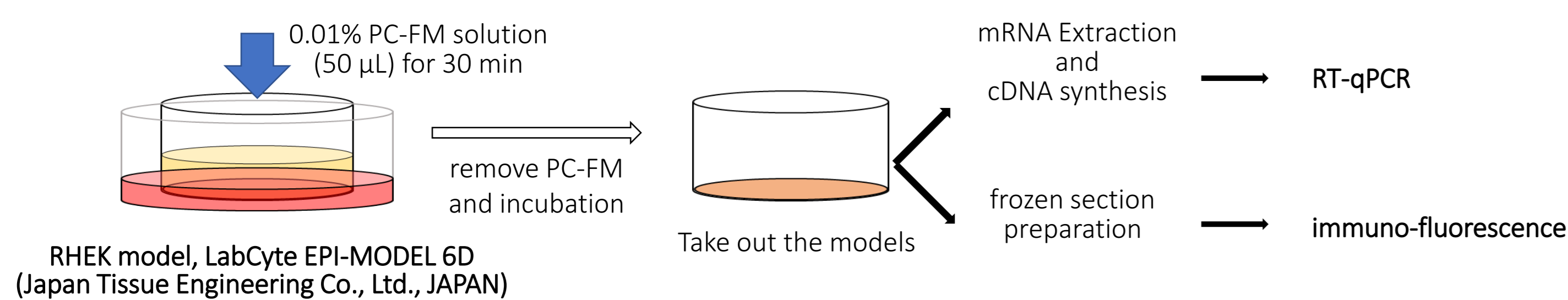
### Preparation of PC-FM



### Evaluation of PC-FM on gene and protein expression in normal human epidermal keratinocytes



### Evaluation of PC-FM on Reconstructed human skin epidermal keratinization (RHEK) models



### Statistical Analysis

All results are expressed as means ± standard deviations (SD). The significances of differences were examined by Student's t-test. Significant differences are indicated by asterisks as follows. \*P<0.05, \*\*P<0.01, \*\*\*P<0.001.

## Results & Discussion:

### The effects of PC-FM in NHEKs

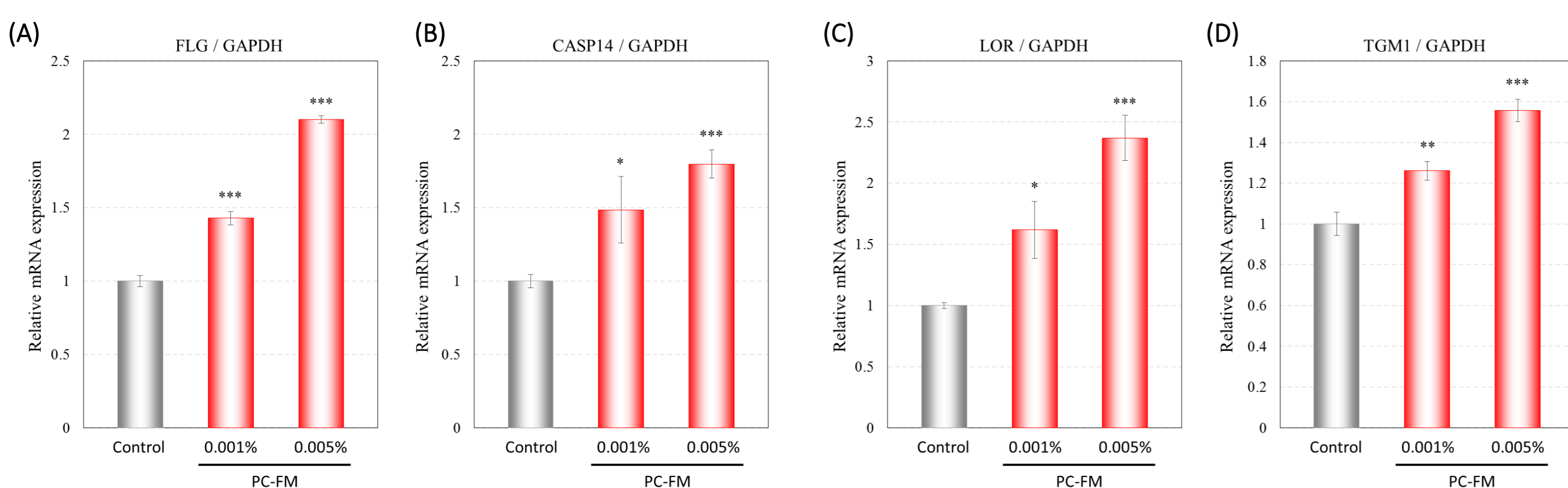


Fig. 1 Effect of PC-FM on gene expression involved in epidermal function. (A) FLG (B) CASP14 (C) LOR (D) TGM1. The significance is compared with untreated control.

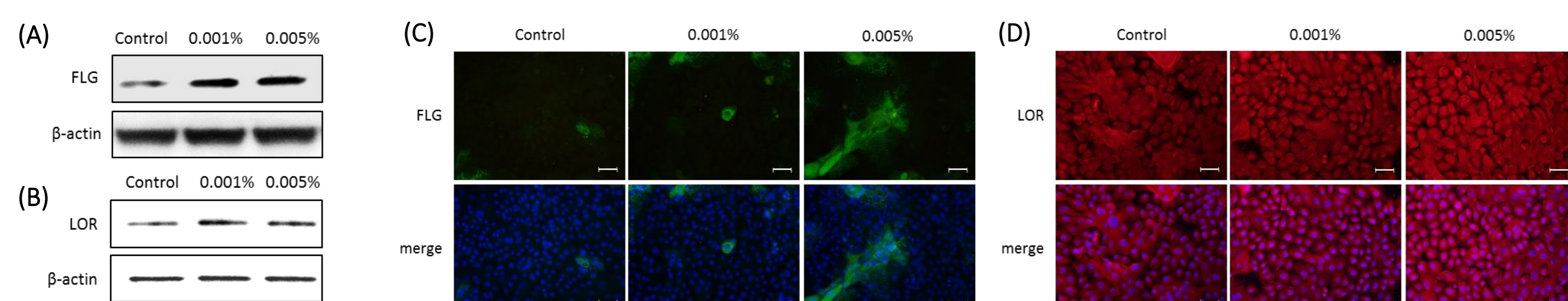


Fig. 2 Effect of PC-FM on protein expression involved in epidermal function. Results of Western blotting and immuno-fluorescence. We observed FLG (A)(C) and LOR (B)(D) expression.

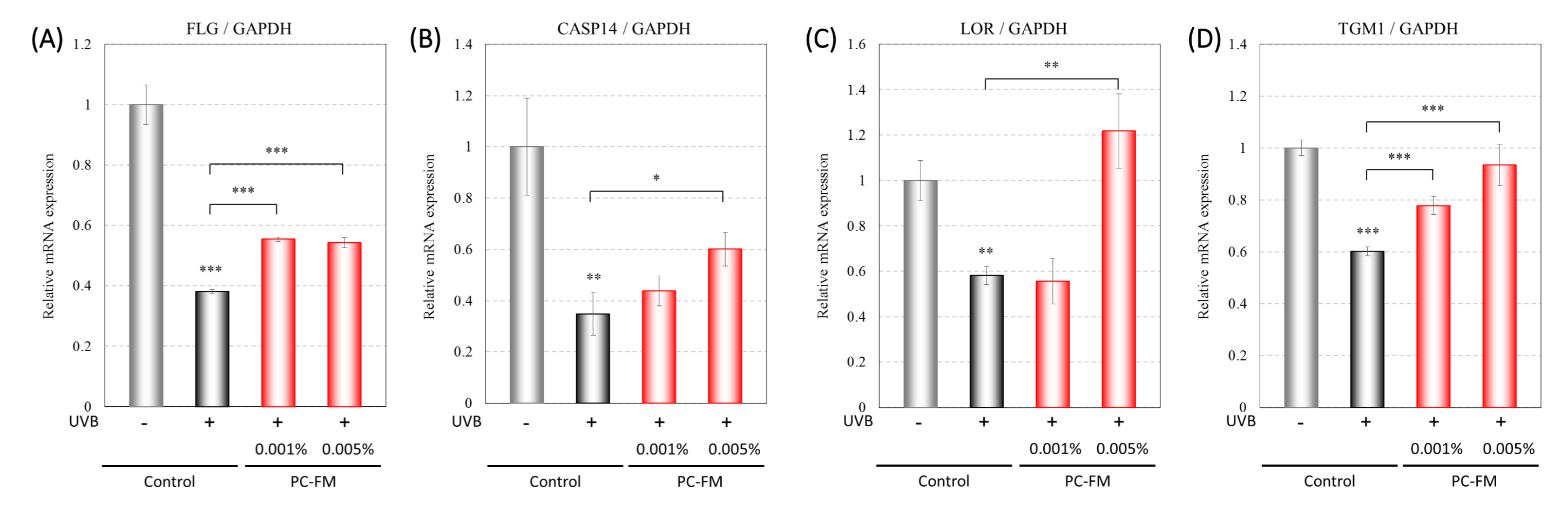


Fig. 3 Inhibitory effect of PC-FM on gene expression against UVB damage. (A) FLG (B) CASP14 (C) LOR (D) TGM1. The value of UVB irradiated control is compared with untreated control. Treatment with PC-FM significantly improved the gene expression compared to irradiated control.

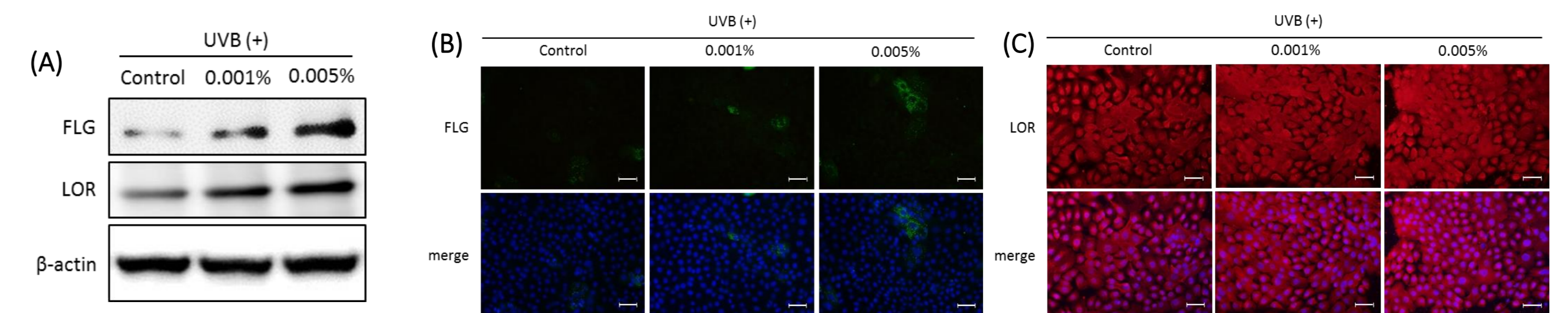


Fig. 4 Inhibitory effect of PC-FM on protein expression against UVB damage. Results of Western blotting (A) and immuno-fluorescence. We observed FLG (B) and LOR (C) expression.

### The effects of PC-FM in RHEK models

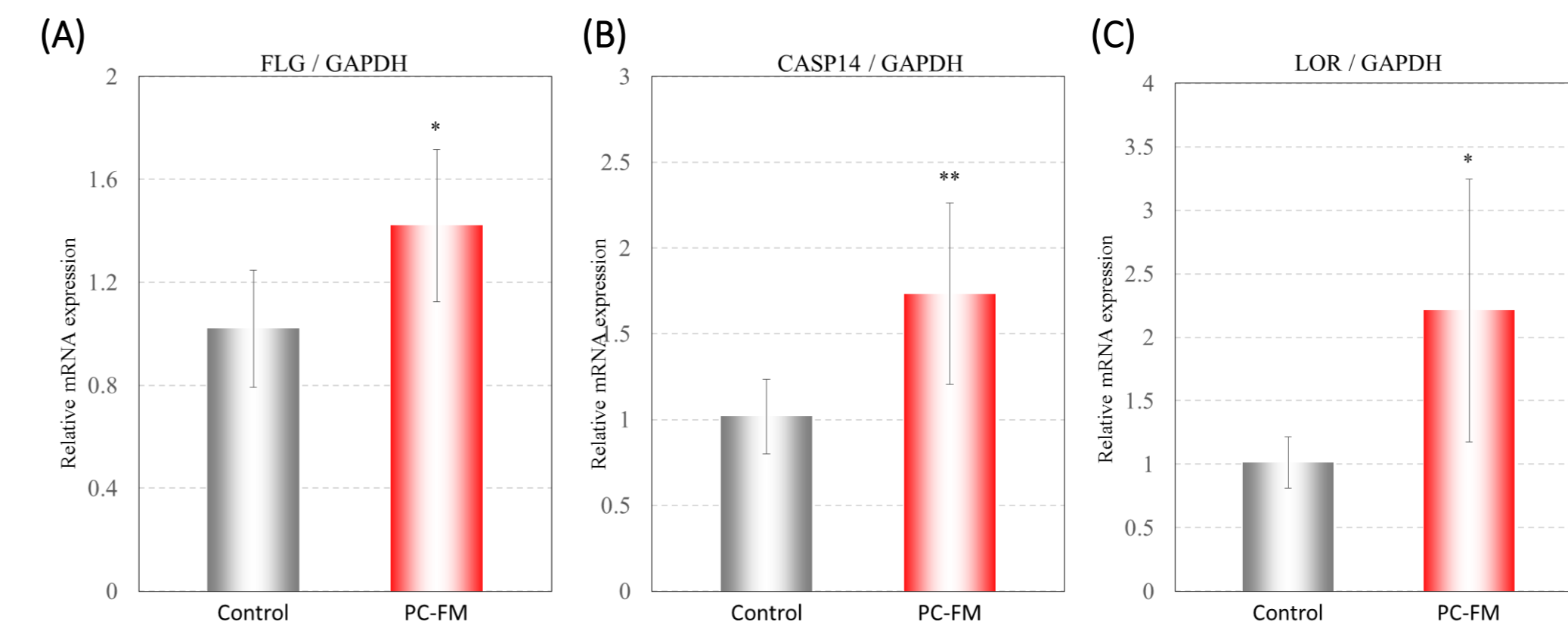


Fig. 5 Effect of PC-FM on gene expression involved in epidermal function. (A) FLG (B) CASP14 (C) LOR. The significance is compared with untreated control.

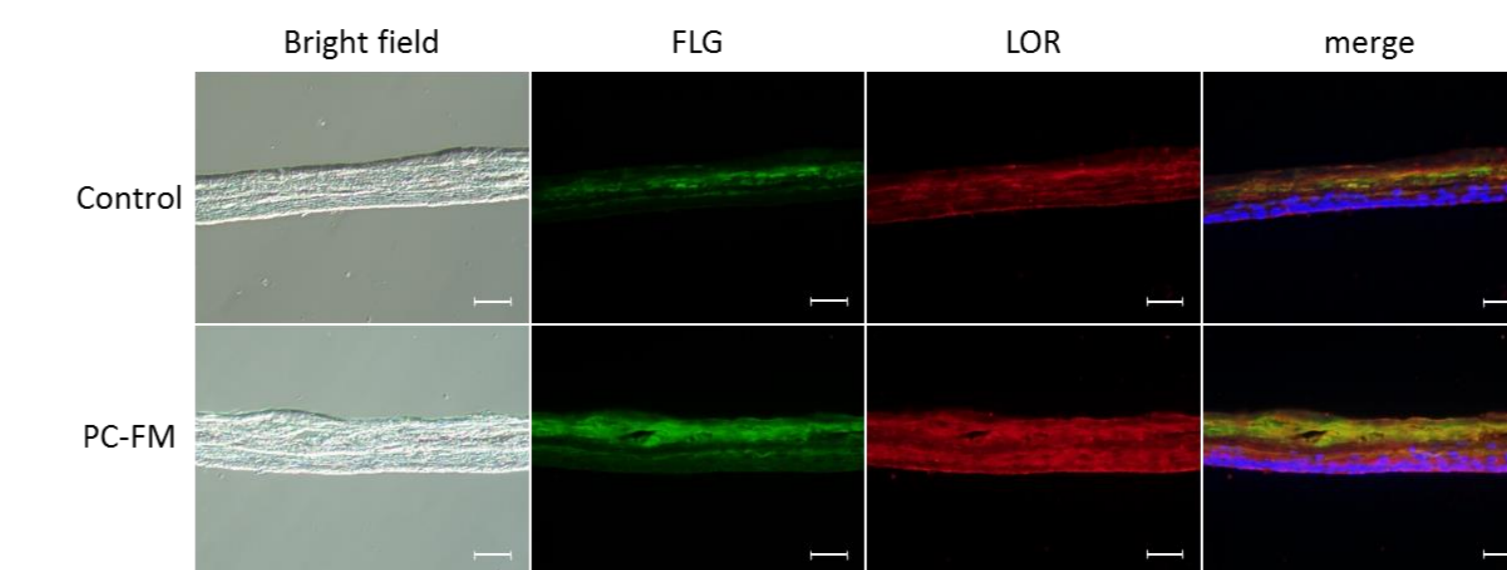
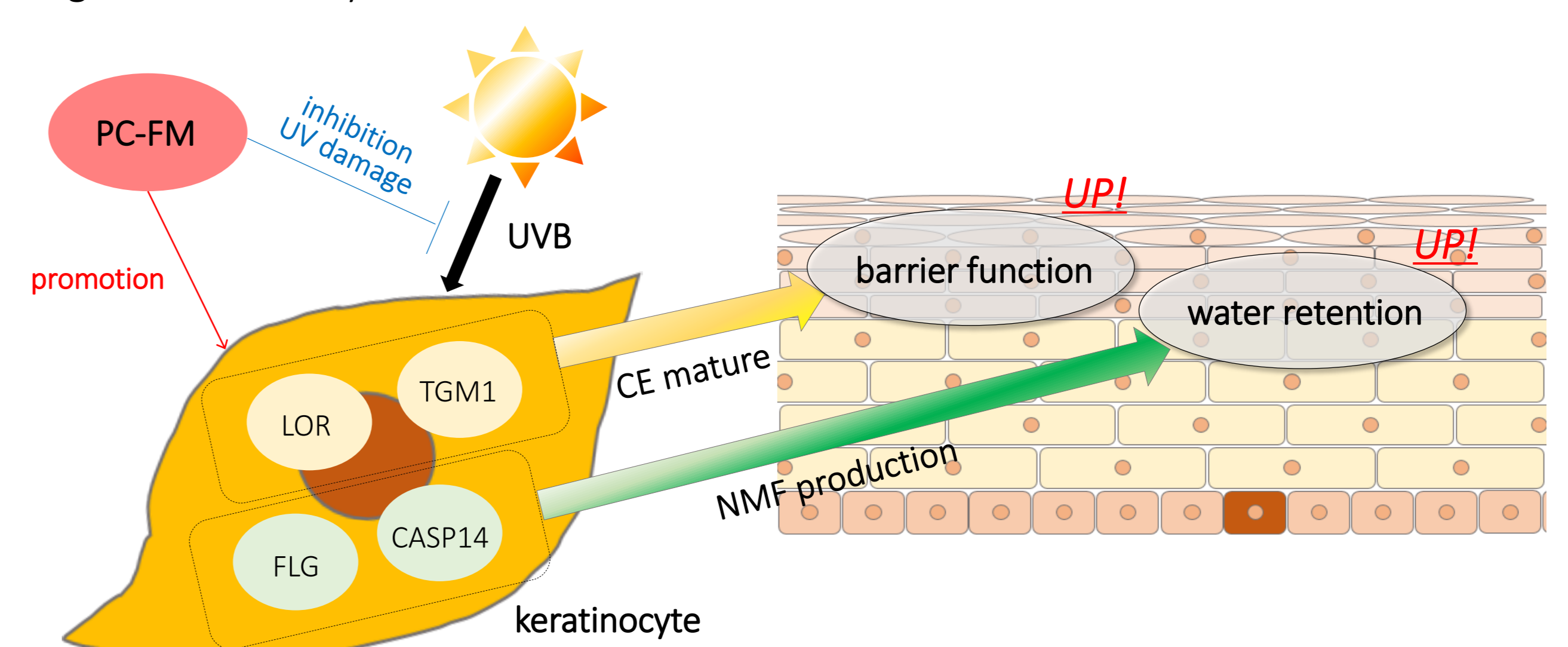


Fig. 6 Effect of PC-FM on protein expression involved in epidermal function.

PC-FM promoted gene expression of FLG, CASP14, LOR and TGM1, and protein expression of FLG and LOR in NHEKs. In RHEK models, we obtained similar results. In addition, PC-FM suppressed the downregulation of gene and protein expression by UVB. It is suggested that PC-FM may lead to prevent and improve dry skin by approaching to CE maturation and NMF production.

## Conclusions:

1. It is thought that PC-FM have two approach for prevention and improvement of dry skin, that not only raises water retention capacity in SC but also strengthens the barrier function.
2. As PC-FM showed the effects not only in NHEKs but also in RHEK models, it may be effective in actual human epidermal tissue.
3. It is suggested that PC-FM suppress the decrease of CE maturation and NMF production due to UV, which is major factor for dry skin.
4. From these results, PC-FM is expected to have high potential as a more useful and effective skincare cosmetic ingredients for dry skin.



## References:

1. Matsuda S., Hisama M., Okumura H., et al. Improvement effects of runner bean seed extract on skin aging. [Translated from Japanese.] *The 135<sup>th</sup> Annual Meeting of the Pharmaceutical Society of Japan*; March 25-28, 2015; Kobe
2. Togo T., Kawasaki M., Kiri S., et al. Improvement effects of fermented runner bean seed extract on skin aging. [Translated from Japanese.] *The 142<sup>nd</sup> Annual Meeting of the Pharmaceutical Society of Japan*; March 25-28, 2022; Nagoya