

Protective effect of nano-capsule of naturally occurring caffeic acid and its analogs against allergic inflammation on normal human skin keratinocytes

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Introduction:

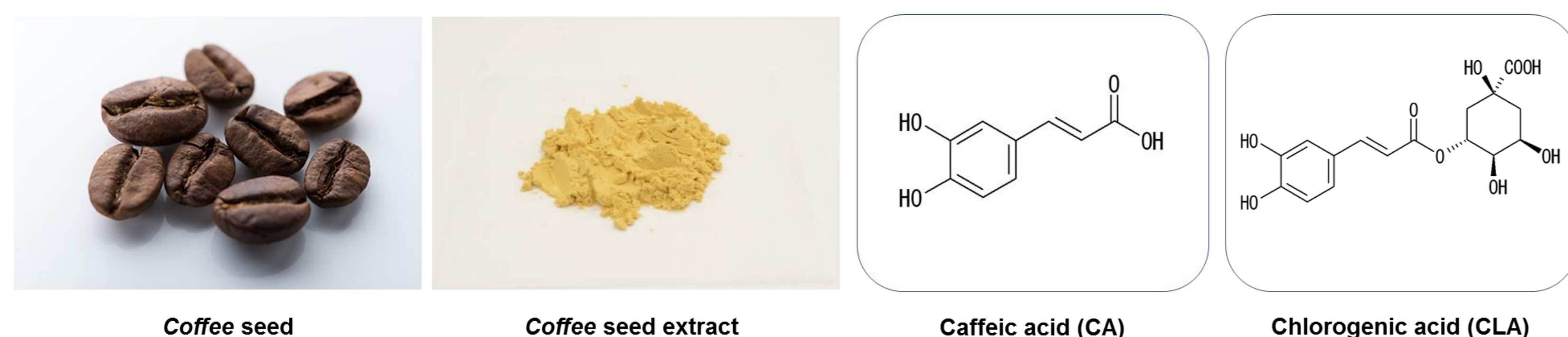
Atopic dermatitis (AD) is also known as atopic eczema, is an inflammatory chronically relapsing skin disease. [1] Epidermal keratinocytes release various inflammatory mediators, such as chemokines and adhesion molecules by Tumor necrosis factor α (TNF- α) and Interferon- γ (IFN- γ) stimulations [2] [3]. These inflammatory factors such as chemokines (IL-8, TARC, and MDC), and the adhesion molecule (ICAM-1), and MMP-9 are involved in the development of inflammatory skin diseases including AD. Common treatments for AD are steroid therapy and immunosuppressive drugs, but these show side-effects, especially with continuous application. [4] Therefore is needed a new natural effective agent and delivery system for anti-inflammatory cosmetics and pharmaceuticals.

Coffea Robusta seed extract (CRS) and *Coffea Arabica* seed extract (CAS) contain many amounts of Caffeic acid (CA) and Chlorogenic acid (CLA). We have been reported that we developed a nano-capsule (NC-CS) containing naturally CA and its analogs, and evaluated the skin permeation in epidermal human skin model and activities of anti-photoaging.

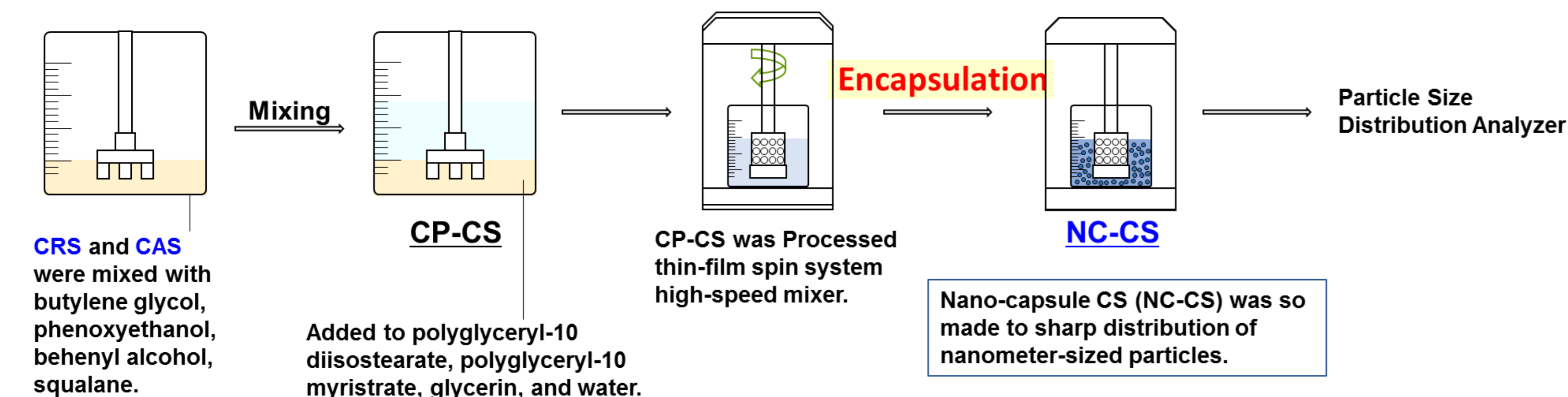
In this study, we evaluated the inhibitory effect of NC-CS of TNF- α /IFN- γ -induced anti-inflammatory in the normal human keratinocytes, as a further effect of skin care.

Materials & Methods:

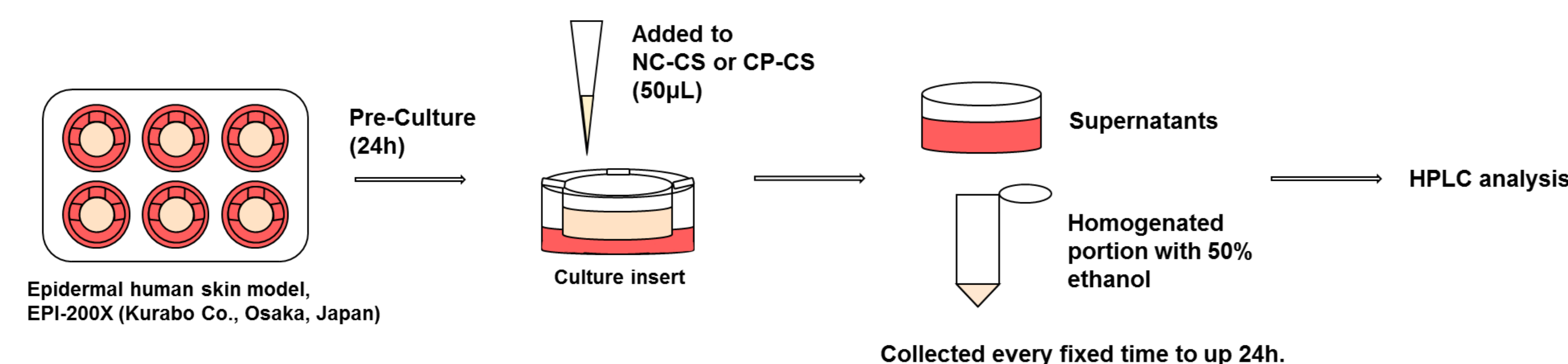
Coffee seed extract (containing CA and CLA)



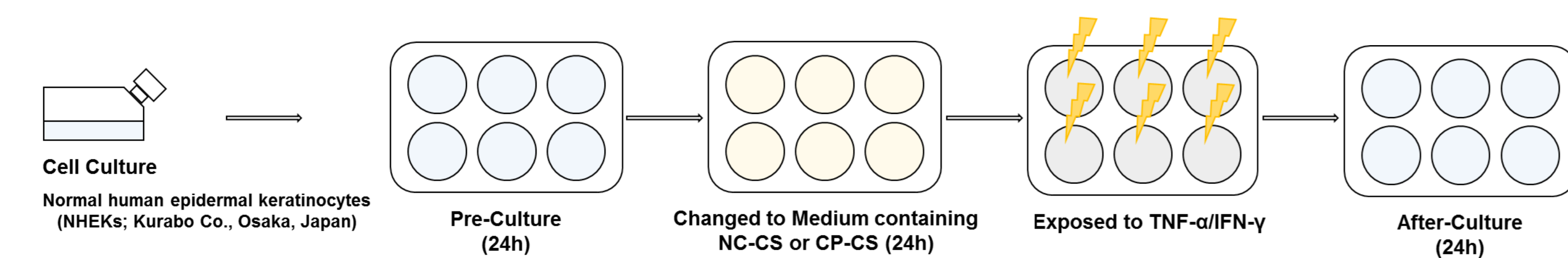
Preparation and morphological analysis of nano-capsules (NC-CS)



Skin permeation and accumulation assay with reconstructed human skin model



Suppression of the mRNA expression of inflammatory mediators induced by TNF- α /IFN- γ in NHEKs



Primers used for Real-time PCR

	Sense	Anti-sense
IL-8	GTCTTGTTCACACTGTGCCT	GCTTCCACATGTCTCCACAA
TARC	ACTGCTCCAGGGATGCCATCGTTTT	ACAAGGGATGGGATCTCCCTCACTG
MDC	AGGACAGAGCATGGCTCGCCACAGA	TAATGGCAGGGAGGTAGGGCTCCTGA
ICAM-1	CACCCTAGAGCCAAGGTGAC	CATTGGAGTCTGCTGGGAAT
MMP-9	CACTGTCCACCCTCAGAGC	GCCACTGTGCGGATAAGG

Results & Discussion:

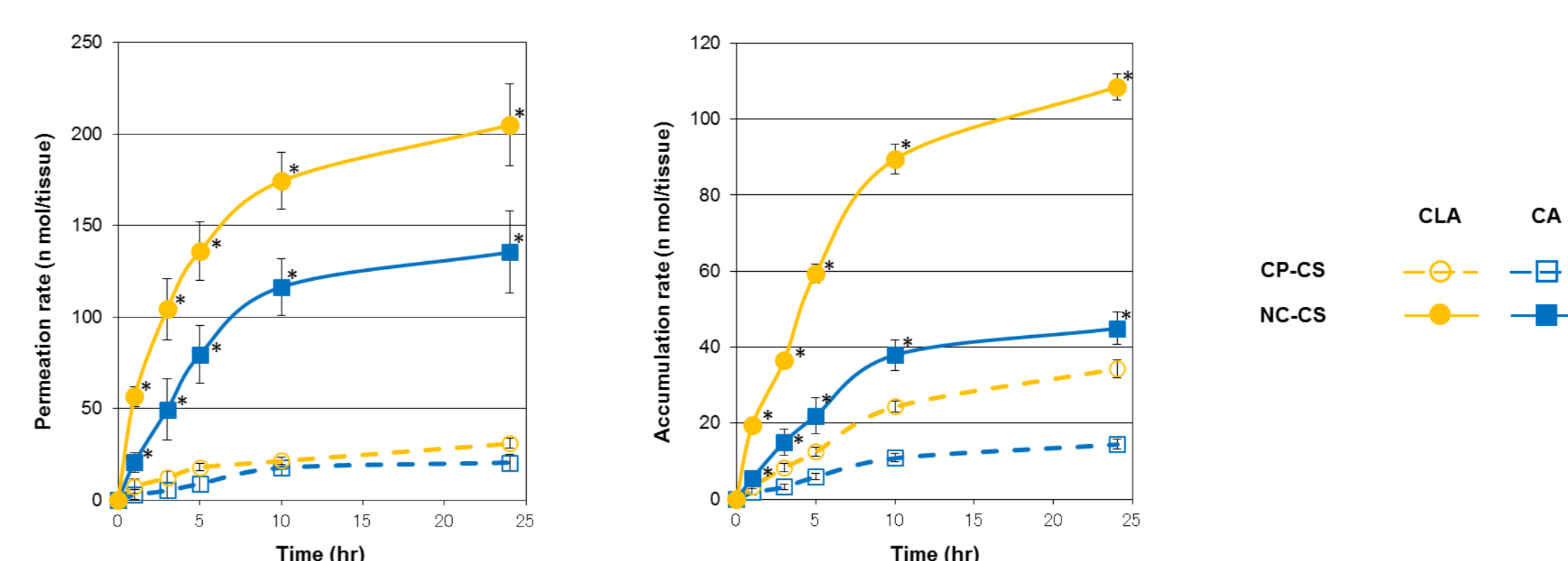


Fig.-1. Skin permeation with NC-CS on EPI-200X.

Each value represents the mean \pm SD of three experiments, and values containing asterisks were significantly different (* P <0.05) from CP-CS group.

We demonstrated a novel nano-capsule NC-CS showed higher skin permeation than non-capsule complex (Fig.-1). This results indicate that NC-CS was an effective agent for the supply of CA and CLA with transdermal activity in the skin.

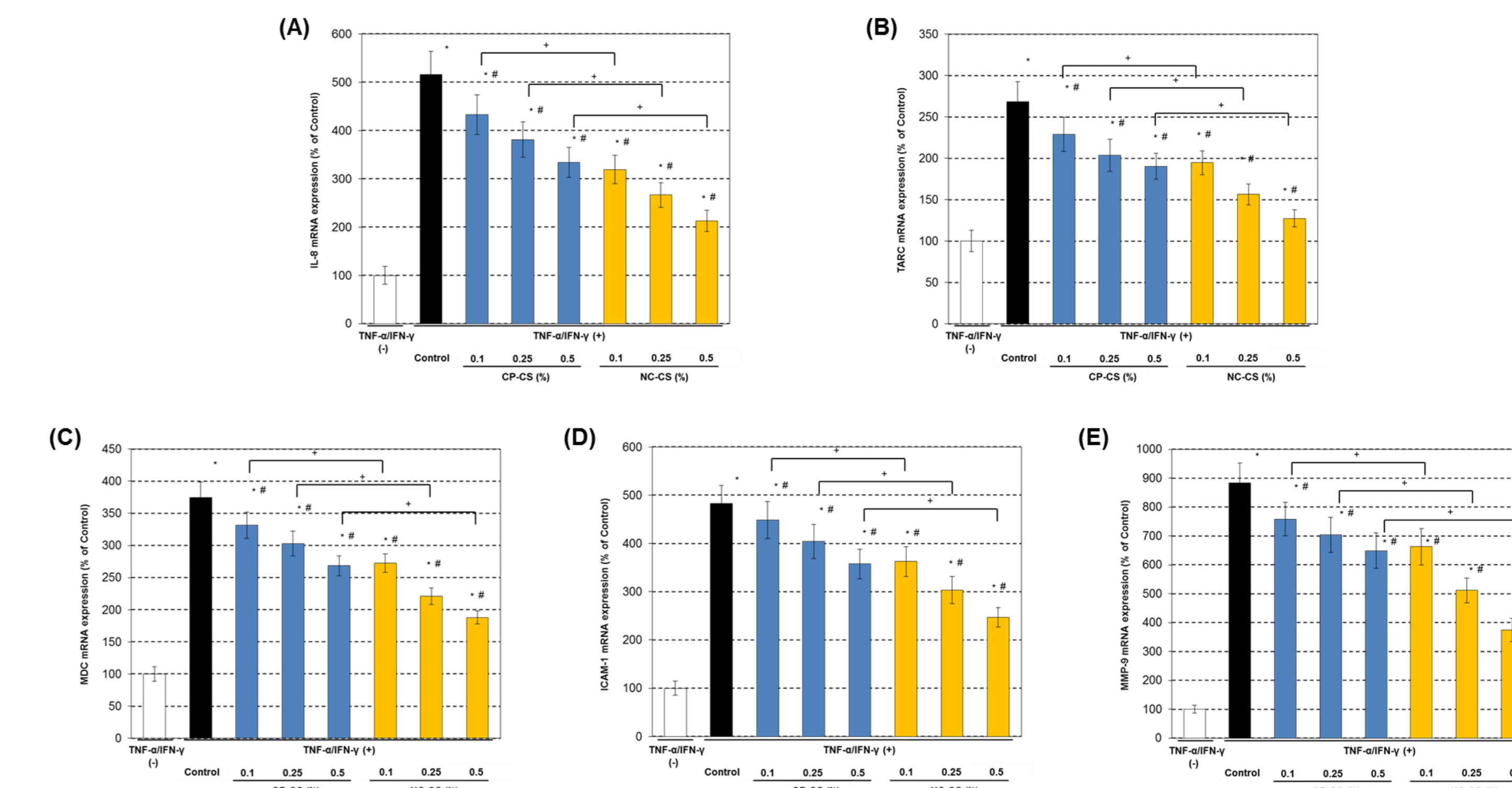


Fig.-2. Suppressive effect of NC-CS on inflammatory mediators induced by TNF- α /IFN- γ .

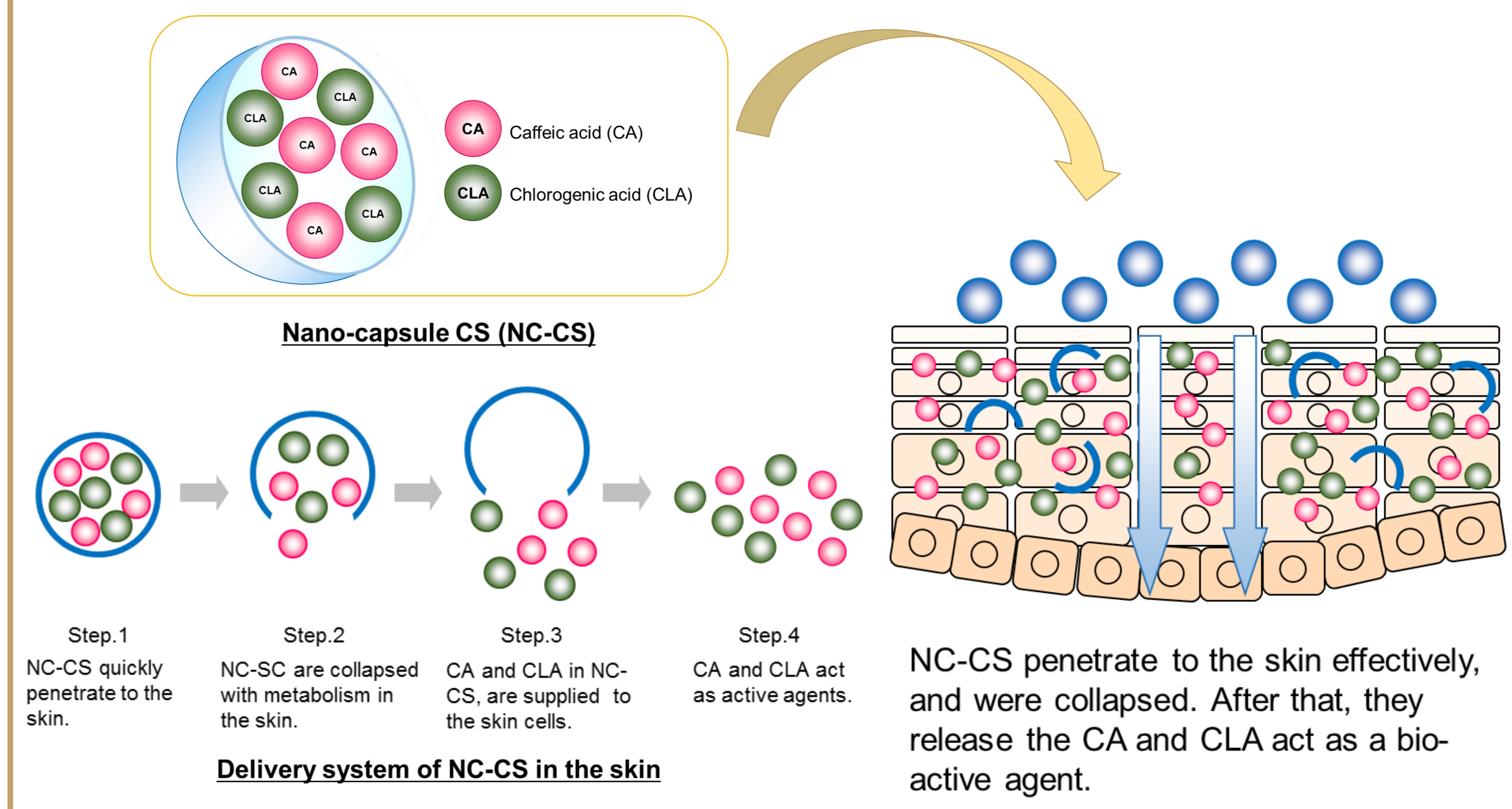
Each value represents the mean \pm S.E. of three experiments. Values were significantly different from the non-irradiated group, TNF- α /IFN- γ (-), at p < 0.05 (*). Values were significantly different from the irradiated group, TNF- α /IFN- γ (+), at p < 0.05 (#). Values were significantly different from the CP-CS group at p < 0.05 (+).

NC-CS suppressed the increases of the mRNA expression of IL-8, TARC, MDC, and ICAM-1, and MMP-9 induced with TNF- α /IFN- γ in a dose-dependent manner (Fig.-2). Furthermore, NC-CS suppressed effect stronger than CP-CS.

These results indicate that NC-CS containing CRS and CAS was an effective anti-inflammatory agent for skin care.

Conclusions:

1. These results indicate that NC-CS was an effective agent for the supply of caffeic acid and its analogs with transdermal activity in the skin, and effective anti-inflammatory agent for skin care.
2. By this study, we developed a novel naturally occurring effective nano-capsule agent, NC-CS and delivery system for anti-inflammatory cosmetics and pharmaceuticals.
3. In the future, we will expect NC-CS is a useful agent as a potential therapy for allergic inflammatory diseases such as dermatitis.



References:

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