Therapeutic Potential of Asarinin in an Atopic Dermatitis Mouse Model: Suppression of Inflammatory Responses and Skin Lesions

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Introduction

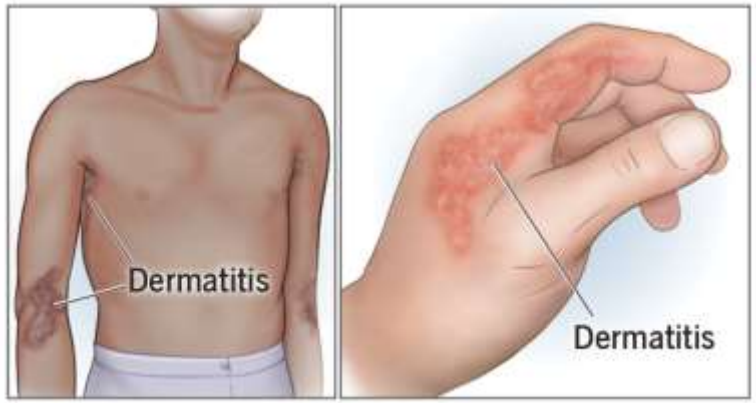
Atopic dermatitis (AD)

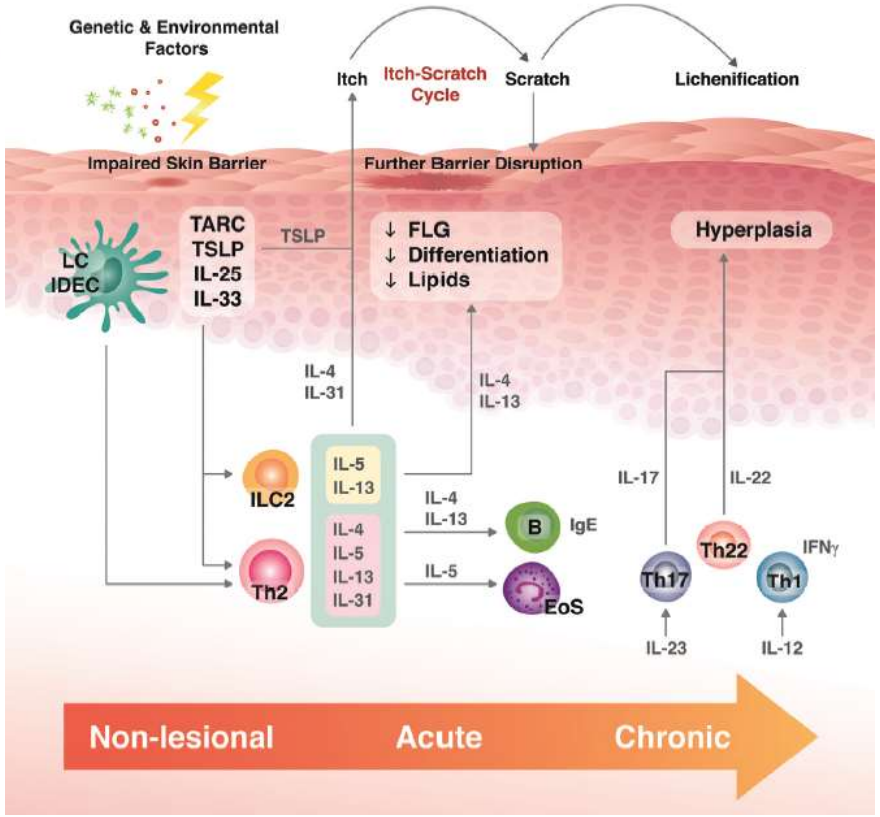
- Chronic inflammatory skin disease

- Characterized by:
Pruritus, erythema, xerosis
Skin barrier dysfunction
Type 2 immune dysregulation

- Global prevalence:
~10-20% in children
~3-10% in adults

- Current treatments:
Topical steroids
Calcineurin inhibitors
Biologics (e.g., Dupilumab)





Cleveland Clinic. *Atopic dermatitis*. Retrieved from my.clevelandclinic.org
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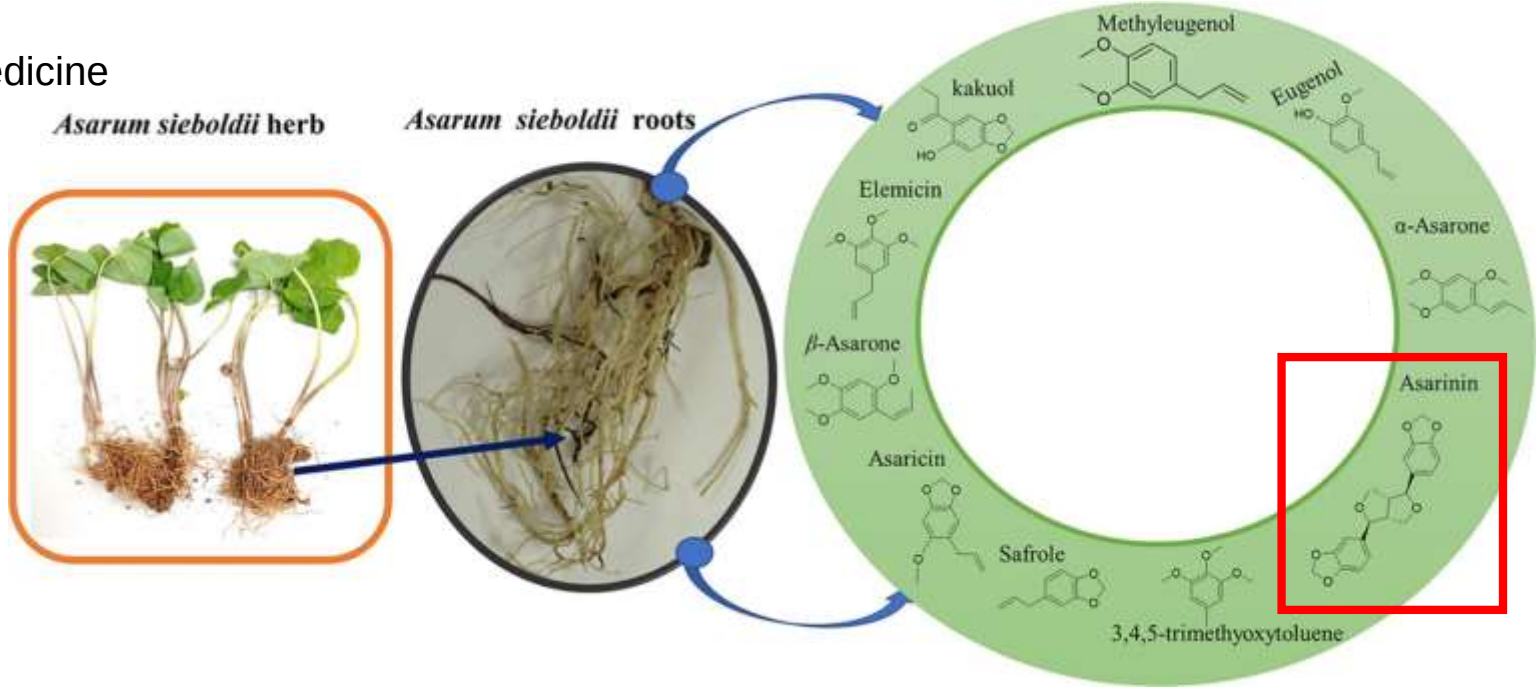
Introduction

Asarinin

- A naturally occurring lignan compound found in *Asarum species* (*Asarum sieboldii*)
Bioactive component responsible for various pharmacological effects

- Distinct characteristics:
Derived from medicinal herbs used in traditional medicine
Exhibits antioxidant and anti-inflammatory activities
Structurally related to sesamin and other lignans

- Potential Benefits & Applications:
Anti-inflammatory and anti-allergic properties
Modulation of immune responses
Neuroprotective and hepatoprotective effects
...and more



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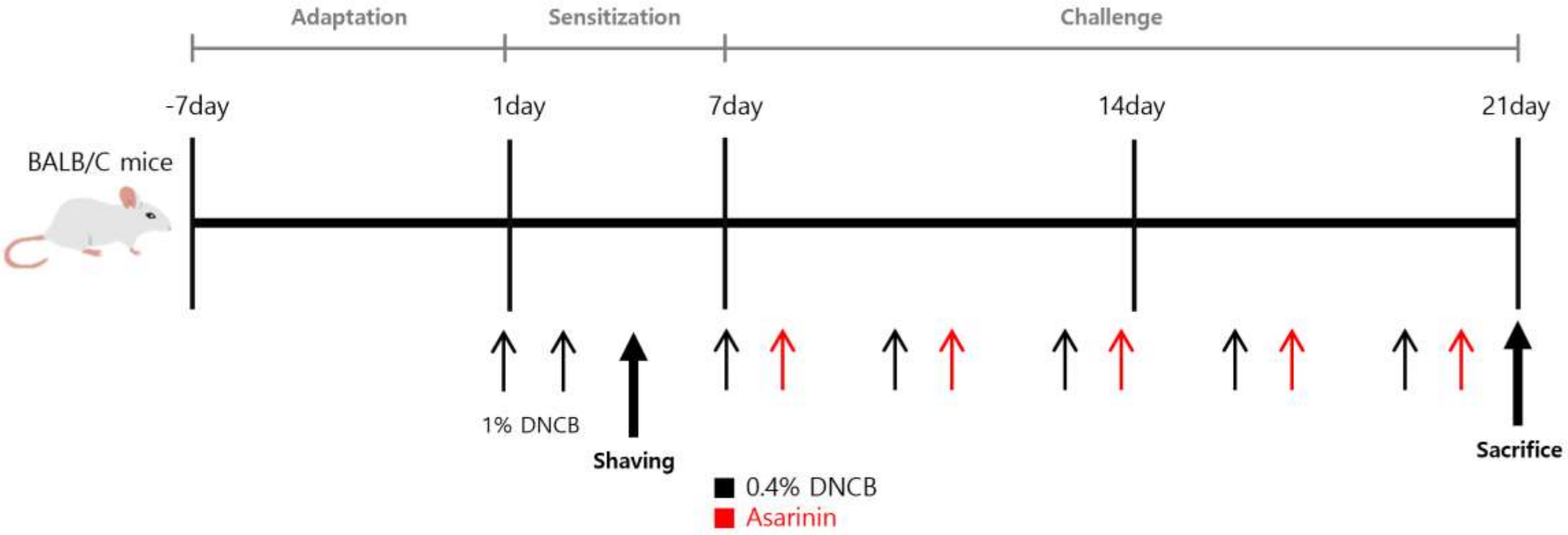
Method



1	Normal (n=5)
2	0.4% DNCB (n=5)
3	0.03% Tacrolimus (n=5)
4	0.3mM Asarinin (n=5)
5	3mM Asarinin (n=5)

Animal Model: Male BALB/C mice, 6 weeks old (n=25).

Treatments: Asarinin (0.3mM, 3mM), DNCB diluted in acetone/olive oil (4:1).

Following Experiments: Clinical evaluation, tissue staining (H&E, Toluidine blue), qRT-PCR.

Result

Topical Asarinin Treatment Alleviates Clinical Symptoms Such as Erythema and Scaling in an AD Mouse Model

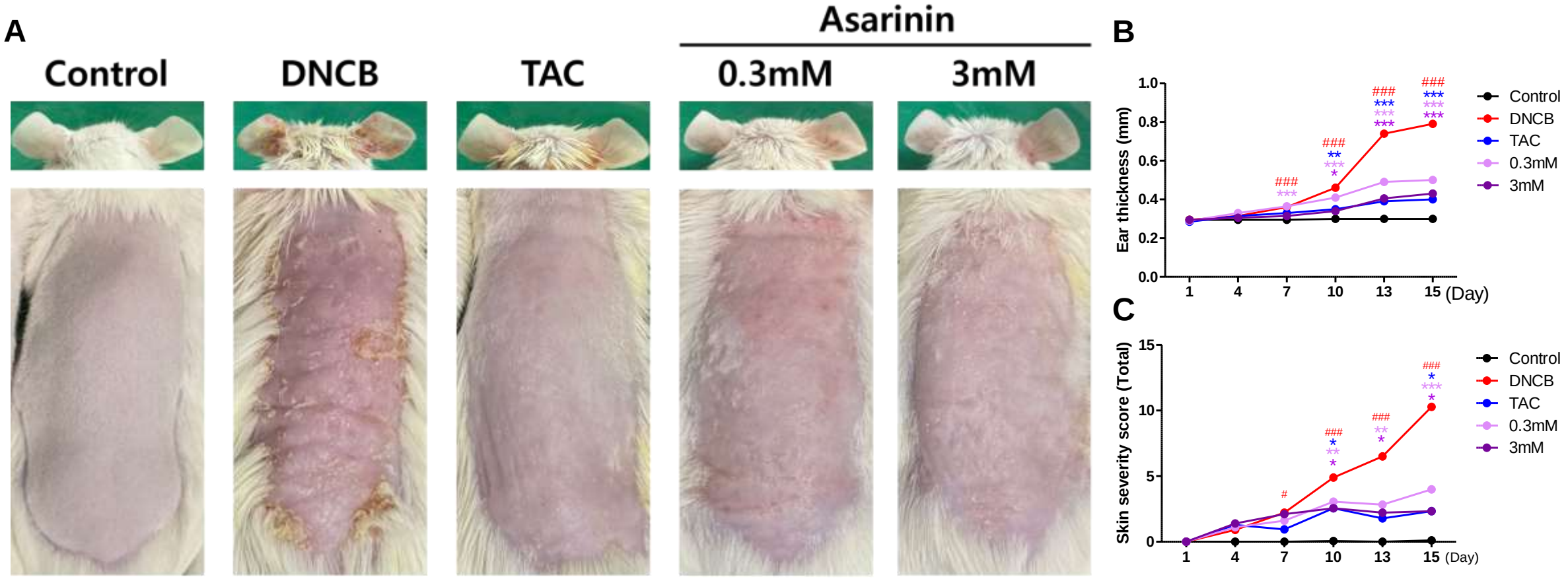


Figure 1. Atopic dermatitis mouse model clinical experiment results. (A) Clinical photo on day 21 before the sacrifice, (B) Average value of both ear thicknesses measured with a Dial thickness Gauge during the challenge period. (C) Average score of 4 items: erythema, dryness, excoriation, and edema. The experiment was conducted in 5 groups, and a total of 25 animals were used, n = 5 per group. Data shown in the figure are presented as mean ± SEM (### $p < 0.001$ vs. Control group; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ vs. DNCB group). DNCB, 1-chloro-2,4-Dinitrochlorobenzene; TAC, 0.03% Tacrolimus.

Significantly increased in the DNCB group compared to control, with significant reduction in Tacrolimus, 0.3mM and 3mM Asarinin groups compared to DNCB.

Result

Asarinin Attenuates Epidermal Hyperplasia and Mast Cell Infiltration in an AD Mouse Model

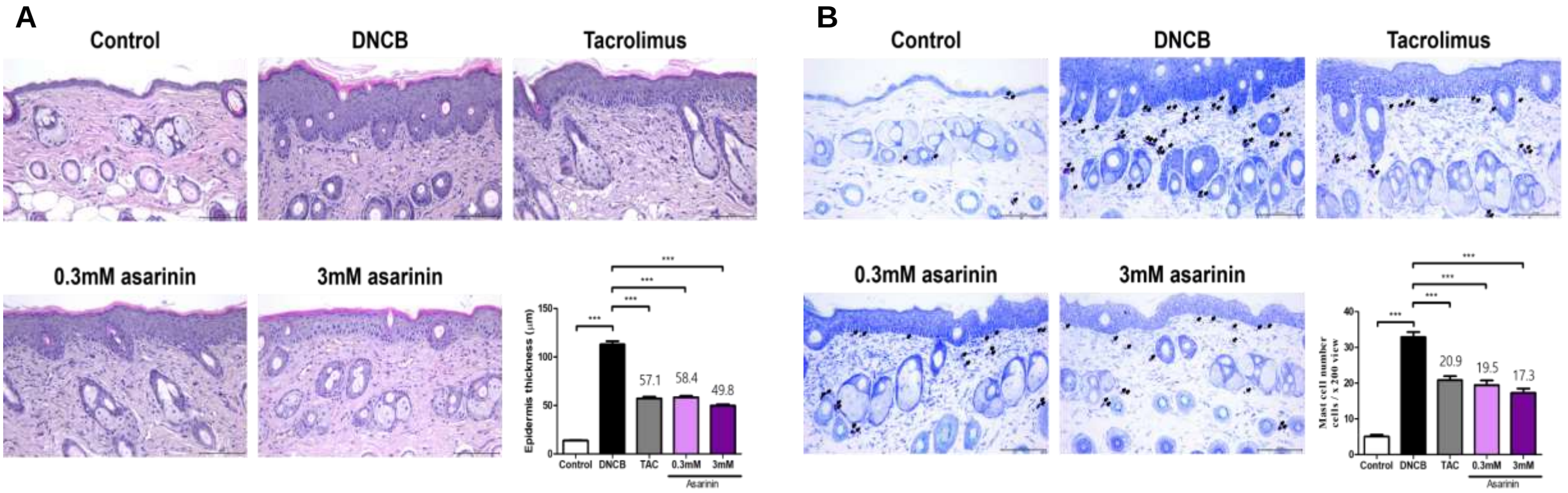


Figure 2. Result of staining after treating asarinin on atopic dermatitis mouse model dorsal skin. (A) Representative H&E-stained images from each group (200× magnification), and results of measuring epidermal thickness after H&E staining (total n = 5/group). (B) Representative Toluidine blue-stained images from each group (200× magnification, arrows indicate mast cells), and results of counting mast cell infiltration (total n = 5/group), data shown in the figure are provided as mean ± SEM (*** $p < 0.001$ vs. Control group or DNCB group). DNCB, 1-chloro-2,4-Dinitrochlorobenzene; TAC, 0.03% tacrolimus; H&E, Hematoxylin and Eosin.

DNCB increased epidermal thickness and mast cell infiltration, both of which were significantly reduced by Tacrolimus and Asarinin treatment.

Result

Asarinin Attenuates Allergen-Induced Inflammatory Cytokine Secretion and Modulates mRNA Expression

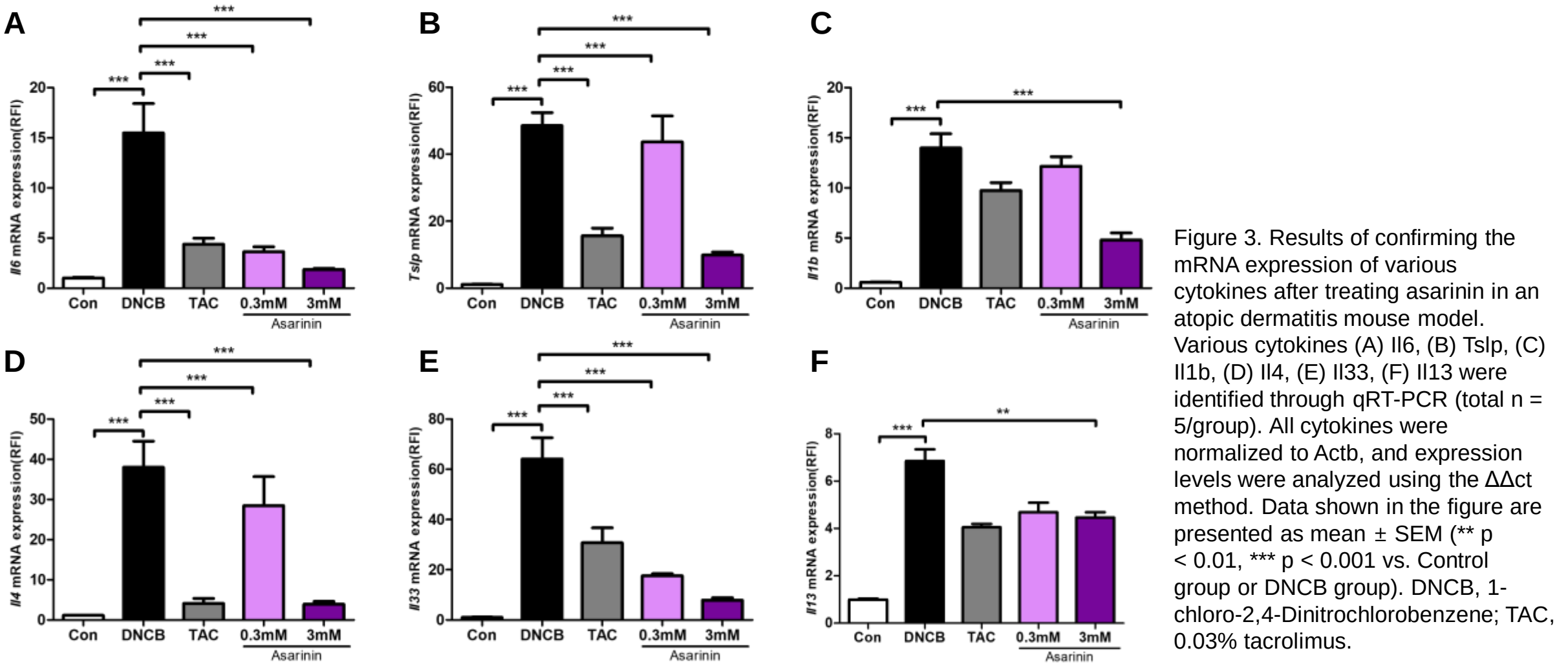
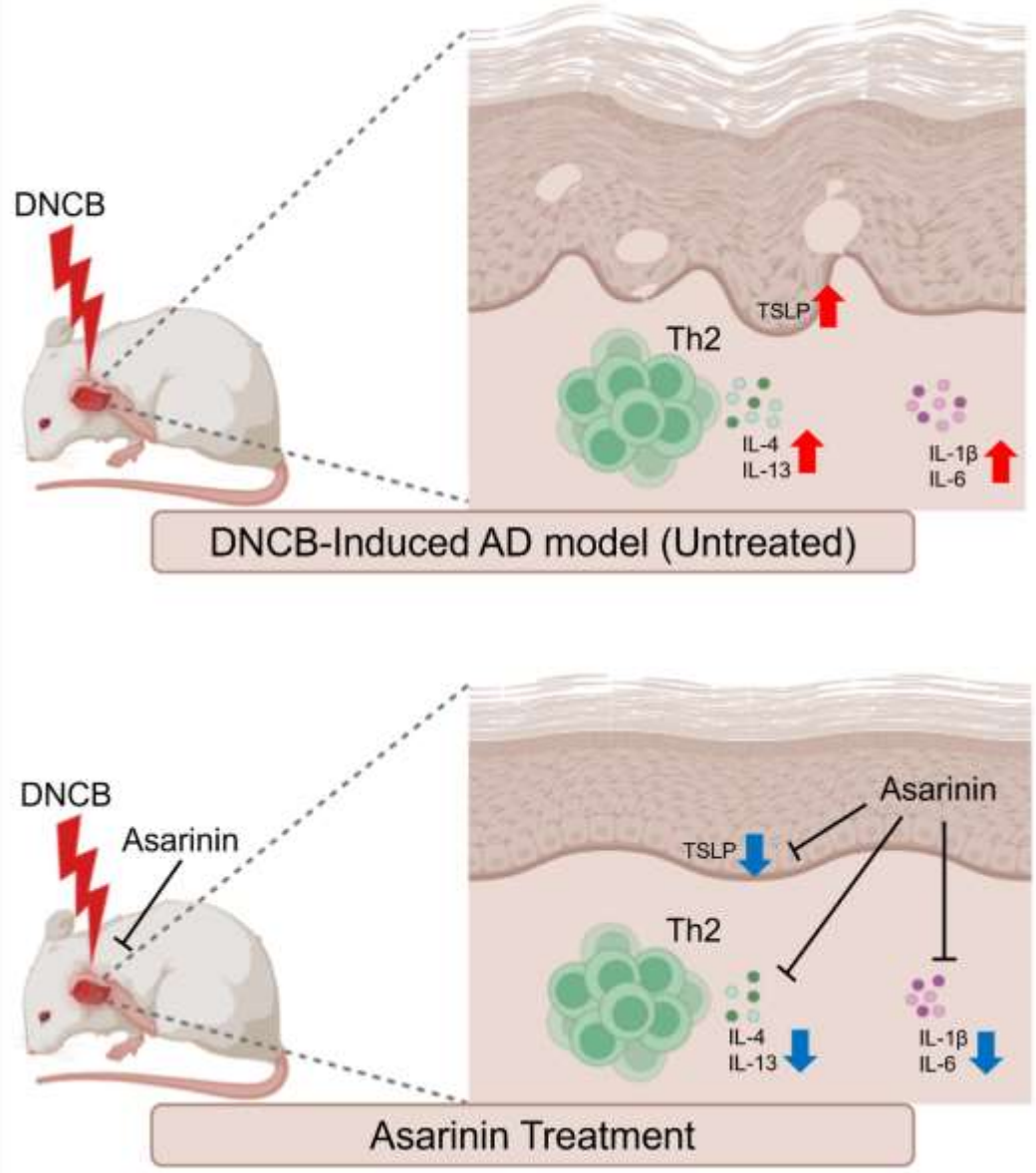


Figure 3. Results of confirming the mRNA expression of various cytokines after treating asarinin in an atopic dermatitis mouse model. Various cytokines (A) Il6, (B) Tslp, (C) Il1b, (D) Il4, (E) Il33, (F) Il13 were identified through qRT-PCR (total n = 5/group). All cytokines were normalized to Actb, and expression levels were analyzed using the ΔΔct method. Data shown in the figure are presented as mean ± SEM (** p < 0.01, *** p < 0.001 vs. Control group or DNCB group). DNCB, 1-chloro-2,4-Dinitrochlorobenzene; TAC, 0.03% tacrolimus.

Asarinin significantly reduced the expression of inflammatory cytokines (*Tslp, Il1b, Il4, Il6, Il13, Il33*) in the AD mouse model.

Conclusion



- Asarinin treatment significantly alleviated clinical symptoms of atopic dermatitis in a mouse model.
- Histological analysis revealed that Asarinin reduced epidermal thickness and mast cell infiltration.
- In addition, qRT-PCR analysis demonstrated decreased expression of Th2 and pro-inflammatory cytokines, supporting its immunomodulatory effects.
- **These findings suggest that Asarinin exerts therapeutic potential for atopic dermatitis by modulating inflammatory signaling pathways and suppressing Th2-mediated immune responses.**