Potential of AP collagen peptides (APCPs) to alleviate inflammatory responses in oxazolone-induced atopic dermatitis (AD)-like mice

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Learning Objective of the Presentation: To evaluate the anti-inflammatory and skin barrier-restorative effects of orally administered APCP in a murine model of oxazolone(OXZ)-induced AD

A Declaration of Conflict of Interest for authors: None to declare

Introduction

- Collagen tripeptide (CTP), a dietary supplement rich in amino acids, offers the advantage of minimal antigenicity and a low potential for allergic reactions.

- Notably, **AP collagen peptide (APCP)**, containing more than 15% CTP, has demonstrated benefits in enhancing skin moisture, improving barrier function, and reducing inflammation in various studies.

- However, its effects on atopic dermatitis (AD) have not yet been investigated.

Objectives

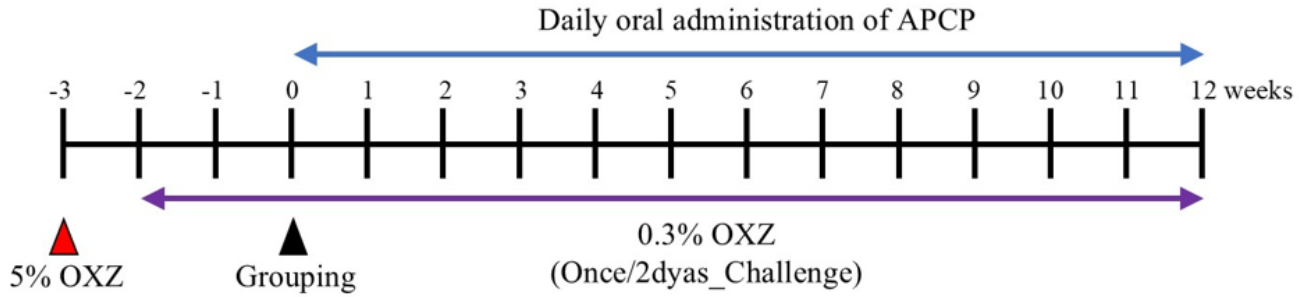
- This study aimed to evaluate the **anti-inflammatory** and **skin barrier-restorative effects** of orally administered **APCP** in a **murine model of oxazolone(OXZ)-induced AD.**

Materials and Methods

- **OXZ-induced AD mouse model**
  - Six-week-old female hairless mice
  - Sensitization phase : 5% OXZ, three weeks before the experiment started
  - Challenge phse : 0.3% OZN, began one week after sensitization

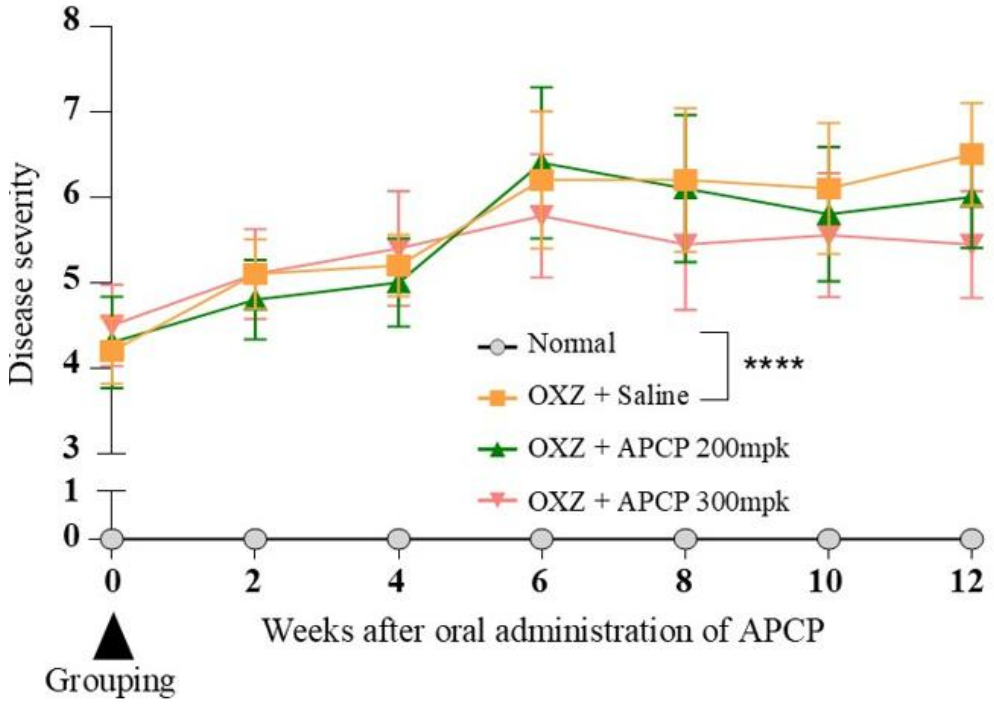
- **APCP**
  - Prepared in powdered form by enzymatically hydrolyzing gelatin derived from the scales of golden threadfin bream (*Nemipterus virgatus*) using a specific collagenase, followed by concentration and drying (Amorepacific, Seoul, Korea)
  - Contains over 15% CTP, including 3% glycine–proline–hydroxyproline
  - Daily oral administration either saline or APCP for weeks, with concurrent 0.3% OXZ treatment

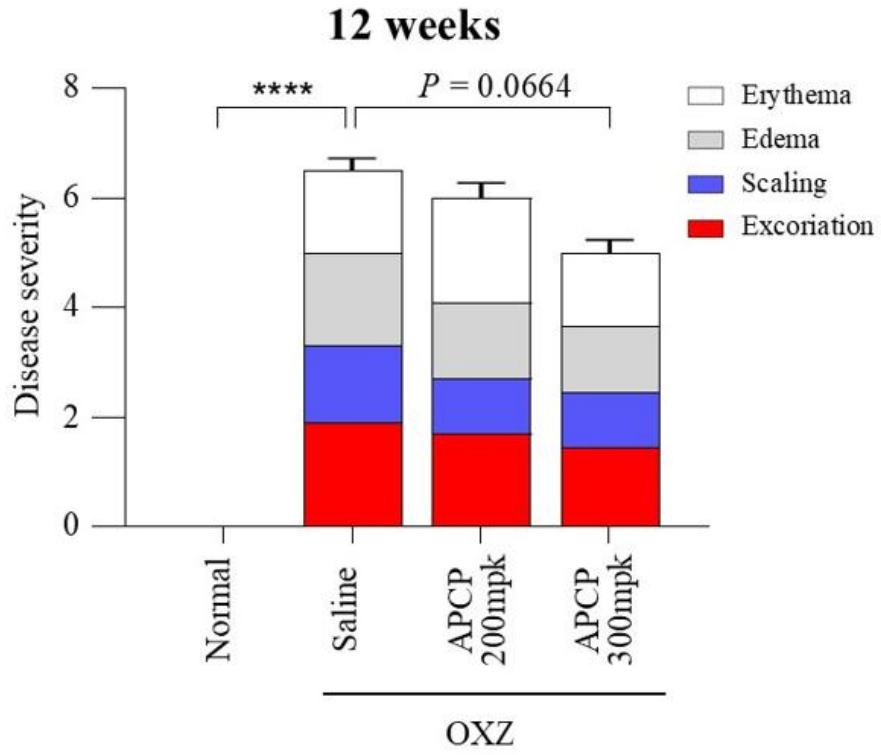
- **Test / control group**
  - Group 1 : normal (n=10)
  - Group 2 : OXZ-only (n=10)
  - Group 3 : OXZ + **APCP 200 mg/kg** (n=10)
  - Group 4 : OXZ + **APCP 300 mg/kg** (n=10)



Results

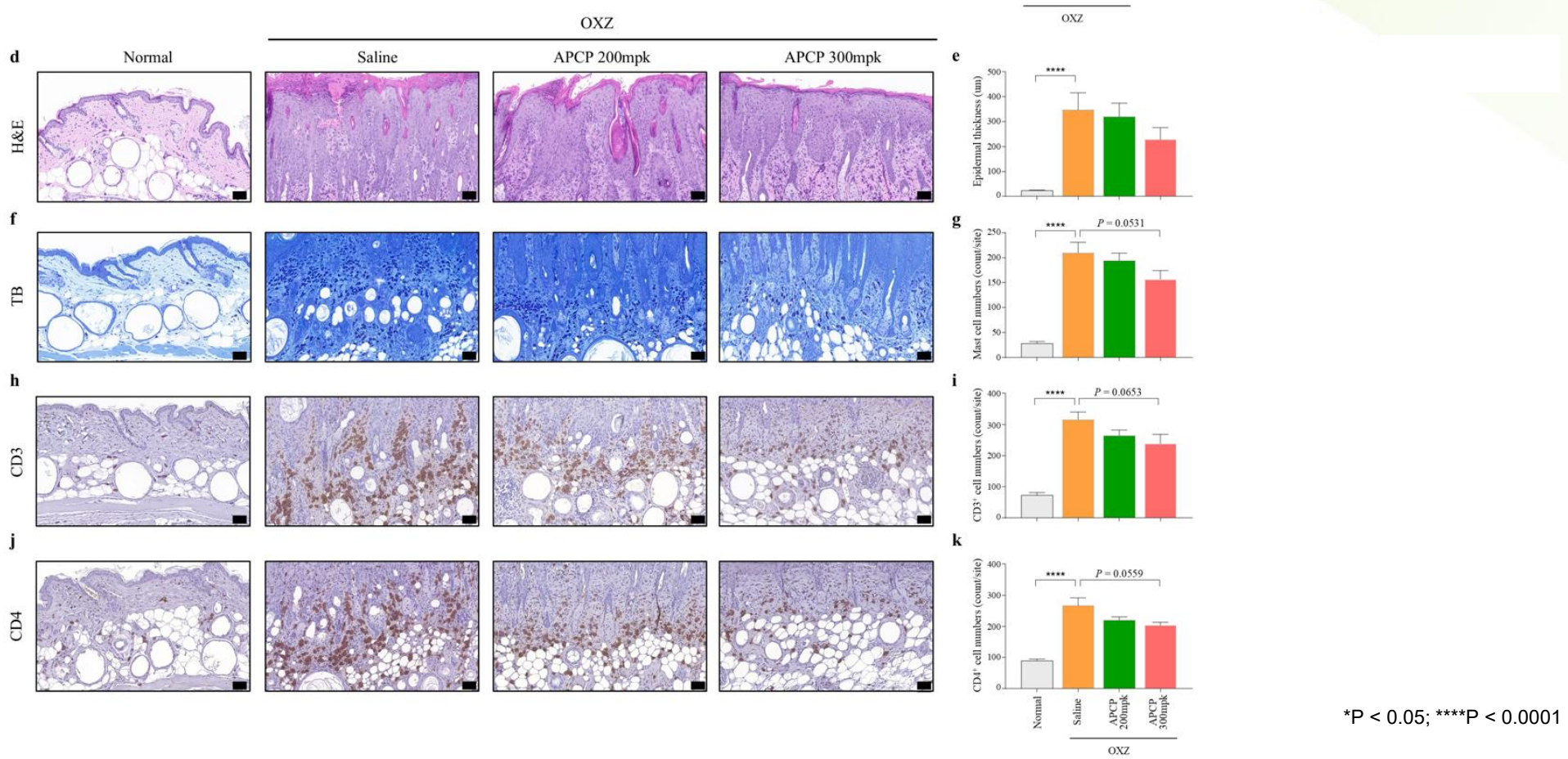
- **Oral Administration of APCP Improves AD-like Symptoms.**
  - **Disease severity**, as a clinical indicator after 12 weeks of oral APCP administration, showed a **decreasing trend** in the OXZ+APCP 300 mpk group compared to the OXZ+saline group.





*P < 0.05; ****P < 0.0001

- **Oral Administration of APCP Improves AD-like Symptoms.**
  - The **epidermal thickness** in the OXZ+saline group was 348.1 ± 68.0 μm, showing a significant increase compared to 24.1 ± 4.9 μm in the normal group. In contrast, treatment with APCP resulted in a **reduction in epidermal thickness**, with values decreasing to 170.3 ± 53.9 μm and 146.7 ± 48.9 μm in the OXZ+APCP 200 mpk and OXZ+APCP 300 mpk groups, respectively.
  - The **number of infiltrated mast cells** in AD-like lesions exhibited a **decreasing trend** in the OXZ+APCP 300 mpk group, with 156.6 ± 17.8 cells/site, compared to the OXZ+saline group. **$CD3^+$ and $CD4^+$ T cell infiltration** also showed a **decreasing trend** in the OXZ+APCP 300 mpk group compared to the OXZ+saline group.



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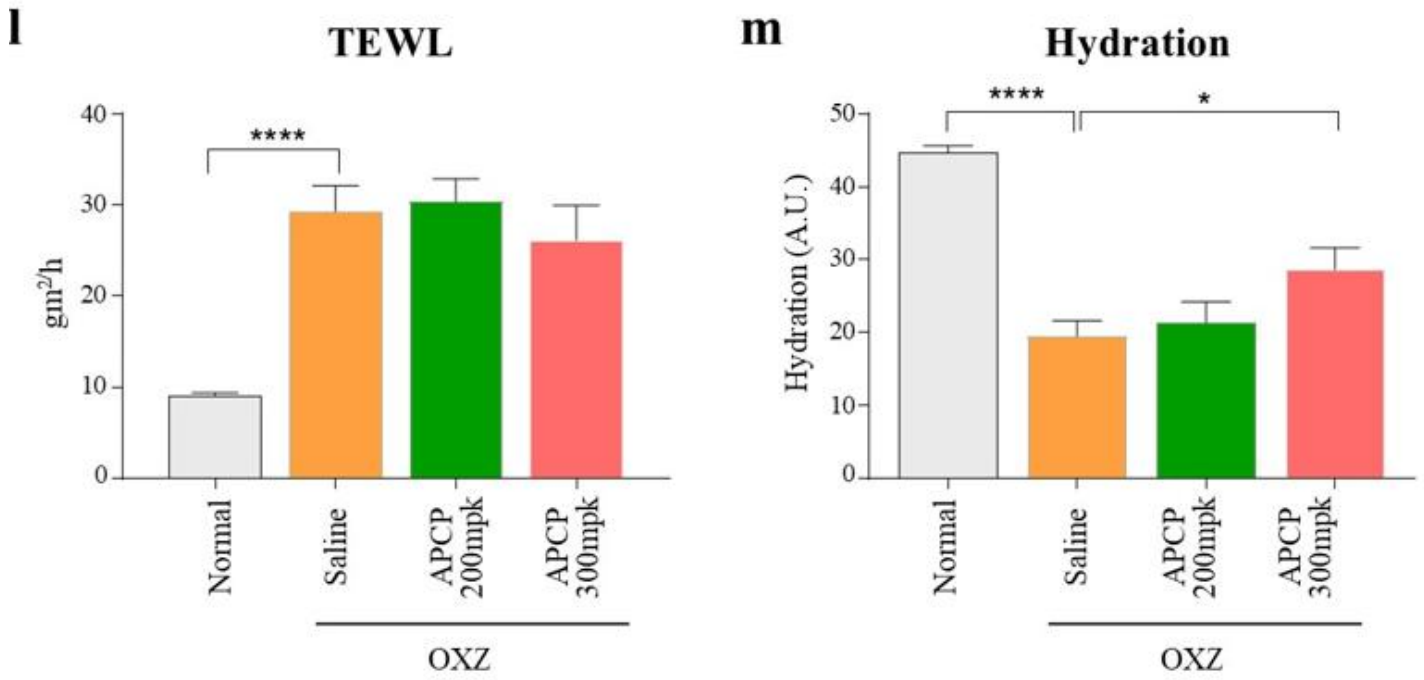
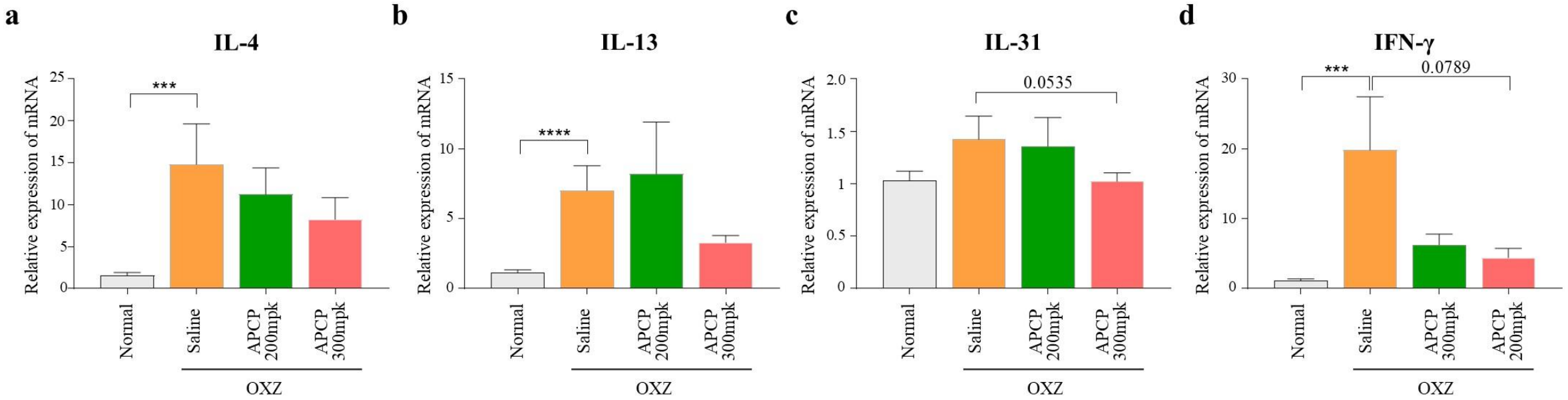
- **Oral Administration of APCP Improves AD-like Symptoms.**
  - **TEWL** in the OXZ+saline group was elevated by 3.2-fold relative to the normal group, whereas TEWL was **reduced** in the APCP 300 mpk group compared to the OXZ-only group.
  - **Skin hydration** levels were significantly **improved** in the APCP 300 mpk group compared to the OXZ+saline group.



*P < 0.05; ****P < 0.0001

- **Oral Administration of APCP Reduces Inflammation in AD-like Lesions.**
  - The expression of inflammatory cytokines was assessed via RT-qPCR.
  - Levels of **IL-4, IL-13, and IL-31** exhibited a **downward trend** in the OXZ+APCP 300 mpk group compared to the OXZ+saline group.
  - Similarly, **IFN-γ** expression demonstrated a **decreasing trend** in the OXZ+APCP 300 mpk group relative to the OXZ+saline group.



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Discussion

- **Oral administration of APCP in OXZ-induced AD-like mice**
  - Increased skin hydration levels
  - Reduced epidermal thickness, mast cell infiltrations
  - Reduced the mRNA levels of inflammatory cytokines, including IFN-γ, IL-4, IL-13, and IL-31

  → **The potential anti-inflammatory and barrier-enhancing effects of APCP**

- **In conclusion,**

APCP shows potential as an adjunctive oral treatment for enhancing skin hydration in AD, warranting further investigation to confirm its therapeutic benefits.