



TAUDERMA



ASTERAL: ASTER TATARICUS EXTRACT
FOR ACNE

DISCOVERY OF ASTER TATARICUS

Strategic Research Initiative: In response to the critical role of IL-1 Beta in inflammatory skin conditions, **Tauderma** initiated a comprehensive screening of its alpine plant library in 2015, targeting plants that could inhibit IL-1 Beta-stimulated cellular responses.

Discovery of Aster Tataricus: This extensive screening led to the discovery of several plants with potent inhibitory effects on IL-1 Beta responses, among which **Aster tataricus** emerged as a particularly effective candidate.



ASTER TATARICUS FOR ACNE

IECIC Listing:

Aster Tataricus is recognized on the International Inventory of Cosmetic Ingredients (IECIC), affirming its acceptance in cosmetic formulations.

Plant Characteristics and Cultivation:

- **Size and Robustness:** The aerial parts of Aster Tataricus can grow up to 70 cm, showcasing the plant's robust nature.
- **Cultivation Ease:** Its cultivation is straightforward, and the plant is harvested mechanically, making it an efficient choice for large-scale production.
- **Novelty in Cosmetics and Acne Treatment:** The extract from Aster Tataricus is a pioneering ingredient in the cosmetic industry, previously unexplored as a treatment for acne, offering a new avenue for acne management solutions.



Tatarian aster

SOURCING AND EXTRACTION

Sustainable Cultivation Practices:

The raw material, Aster Tataricus, is sourced from plants cultivated under controlled organic conditions in Switzerland, ensuring high-quality and eco-friendly practices.

Optimized Extraction Process:

- **Preparation:** Post-harvest, the plants are carefully dried and ground to prepare for extraction.
- **Optimization:** Extraction conditions are meticulously optimized to maximize the yield of bioactive molecules, resulting in a highly potent native dry extract.



SOURCING AND EXTRACTION

Formulation Details:

- **Concentration:** The dry extract is skillfully solubilized in glycerin to achieve a precise 3% concentration, ensuring consistency and efficacy in final cosmetic formulations.

Quality Control:

- **Analytical Methodology:** An advanced High-Performance Liquid Chromatography (HPLC) method has been developed to identify and quantify the main ingredients, playing a critical role in the quality control (QC) processes throughout production.



INTRODUCTION TO INFLAMMASOMES

Inflammasome Overview:

Inflammasomes are complex structures within cells of the innate immune system, specifically cytosolic multiprotein oligomers, which are pivotal in triggering inflammatory responses.

Expression in Skin:

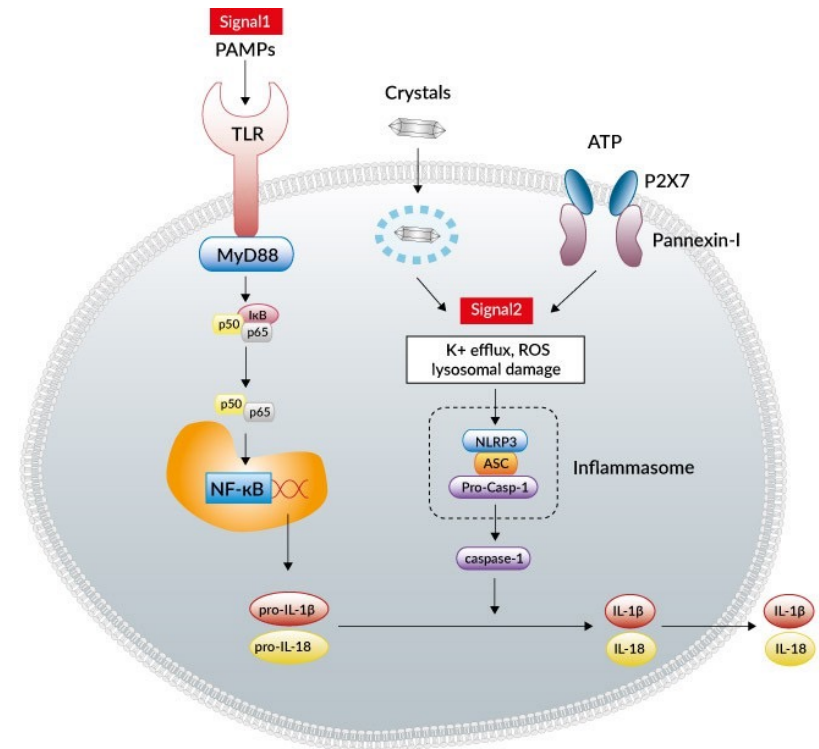
Inflammasome components are highly expressed in the epithelial barrier tissues, including human keratinocytes, highlighting their critical role in skin health and immunity.

Activation Triggers:

These complexes are activated by microbial infections (bacterial or viral) and by danger-associated molecular patterns (DAMPs), signaling the presence of tissue damage or microbial invasion.

Role in Inflammation:

Upon activation, inflammasomes orchestrate the proteolytic cleavage, maturation, and subsequent release of pro-inflammatory cytokines, specifically interleukin 1 β (IL-1 β) and interleukin 18 (IL-18), which are key mediators in inflammatory processes.



<https://www.invivogen.com/review-nlrp3-inflammasome>

IL-1 BETA AND ACNE

IL-1 Beta and Skin Conditions:

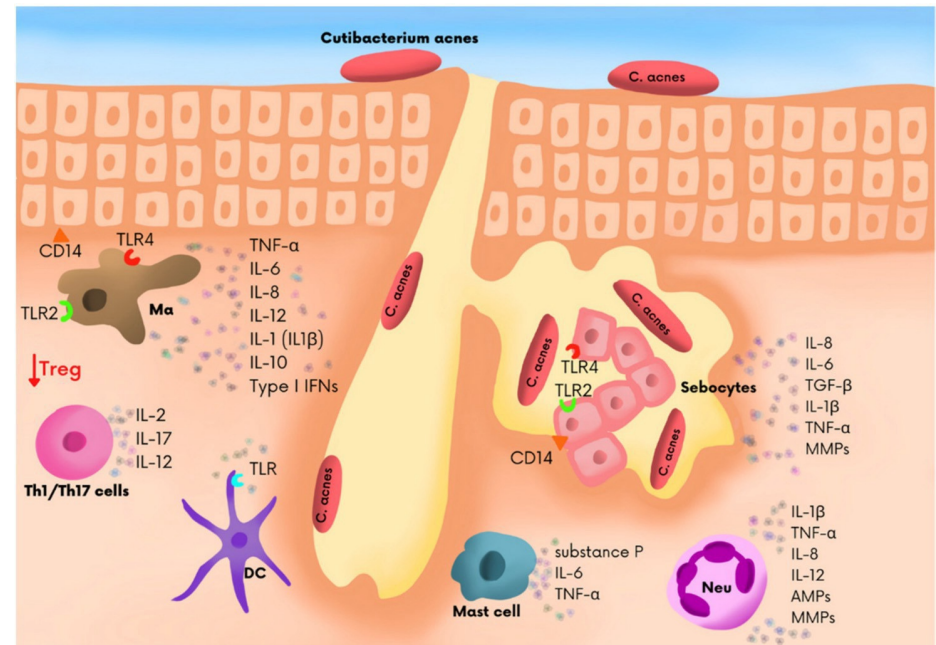
IL-1 Beta is linked to the inflammatory responses observed in various skin disorders, including psoriasis, vitiligo, acne vulgaris, seborrheic dermatitis, and atopic dermatitis, highlighting its central role in dermatological inflammation

Role in Biofilm Production:

IL-1 Beta contributes to the formation and stability of the biofilm produced by *Cutibacterium acnes* (C. acnes), enhancing the microbe's resistance against antibacterial treatments and complicating acne management.

Detrimental Effects of Overexpression:

Excessive or prolonged production of IL-1 Beta, a key cytokine activated by inflammasomes, can harm skin health, leading to chronic inflammation and further skin damage.



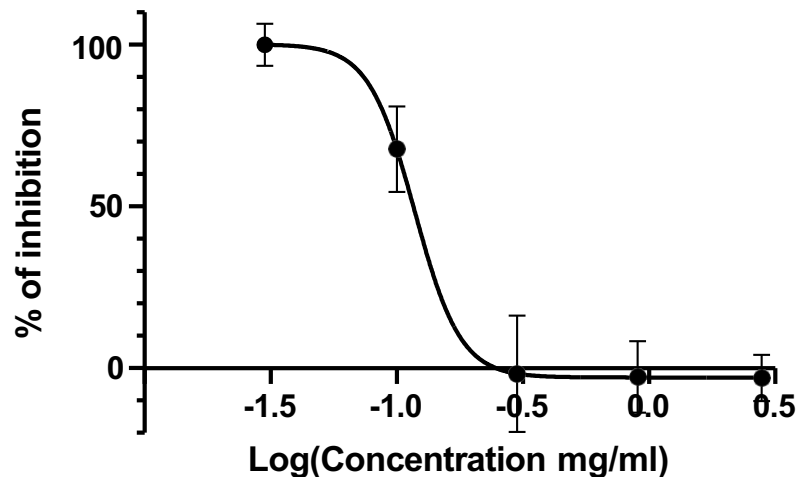
<https://www.mdpi.com/2077-0383/11/6/1579>

ANTI-IL-1 BETA ACTIVITY

Potent Anti-IL-1 Beta Activity:

The aqueous extract from the aerial parts of *Aster Tataricus* demonstrated robust anti-inflammatory properties by fully inhibiting the production of IL-6, a pro-inflammatory cytokine, in human epithelial cells. This effect was observed in vitro, with an impressive half-maximal inhibitory concentration (IC₅₀) of just 0.12 mg/ml, highlighting the extract's potent action against IL-1 Beta-stimulated responses.

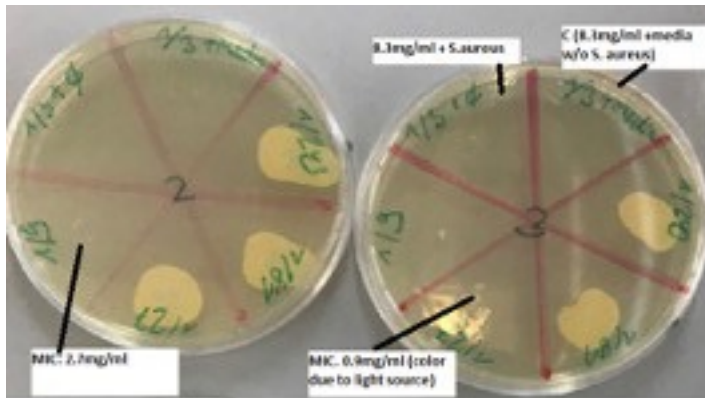
Effect of various concentration of AT on the IL1-beta stimulated IL-6 release in human epithelial cells in vitro



ANTI-BACTERIAL ACTIVITY

Anti-bacterial Activity Assessment:

- **Agar Drop Test:** A precise method involving the Agar Drop Test was employed to evaluate the anti-bacterial properties of the Aster Tataricus extract.
- **Procedure:** Various dilutions of the extract were mixed with a medium containing 1.25×10^5 colony-forming units per milliliter (cfu/ml) of *S. aureus* or *C. acnes*. This mixture was then placed on an agar culture plate to assess the extract's efficacy.



Treatments	S. aureus		C. acnes	
	MIC [mg/ml]	colonies in drop	MIC [mg/ml]	colonies in drop
AT Aerial parts	0.9	none	0.3	none
AT Roots	8.3	none	2.9	none

Determining Minimal Inhibitory Concentration (MIC):

- **MIC Definition:** The Minimal Inhibitory Concentration (MIC) is the lowest concentration of the extract that completely inhibits microbial growth, effectively stopping the proliferation of the microbes on the agar plate.
- **Significance:** This measure is crucial for determining the potency and dosage needed for the extract to function as an effective anti-bacterial agent in cosmetic and therapeutic applications.

SAFETY & TOLERABILITY

Comprehensive Safety Screening:

- **Allergens, Pesticides, and Heavy Metals:** The 3% concentration of Aster Tataricus extract in glycerin was rigorously tested and found free of 68 common allergens, pesticides, and heavy metals, ensuring its safety for cosmetic use.

Phototoxicity Testing:

- **Cell-Based Assays:** In tests conducted up to a concentration of 1mg/ml on Balb 3T3 cells, the Aster Tataricus extract did not induce phototoxicity, demonstrating its safety under exposure to light.

Irritation Assessment:

- **In Vitro Skin Model:** The 3% extract did not cause irritation in an in vitro model using reconstructed human epidermis (EPISKIN), confirming its gentleness on skin cells.

Dermal and Ocular Tolerance:

- **Clinical Patch Test:** A cream formulation containing 0.03% of the extract was subjected to patch tests on human skin and eyes and was found to be very well tolerated, highlighting its suitability for sensitive applications.

CLINICAL TESTING

Clinical Trial Setup:

- **Study Design:** An open-label clinical trial was conducted with 21 healthy volunteers, each diagnosed with grade 2 or 3 acne.
- **Application Regimen:** The cosmetic cream containing 0.03% Aster Tataricus extract was applied twice daily, following a consistent treatment schedule.

Dermatological Assessment:

- **Initial and Final Evaluation:** Skin lesions on the faces of the volunteers were thoroughly assessed and quantified by a dermatologist on the first day and after four weeks (Day 28) of treatment to measure efficacy.

Wilcoxon test for paired data:

S: Significant ($p \leq 0.05$)

NA*: Not Applicable: the percentages of variation are reported only from 10 volunteers who presented acne lesions of this type (grade 3) on D1 and/or D28.

	Total score		Comedones and microcysts		Papulae		Pustules		Nodules and cysts	
	D1	D28	D1	D28	D1	D28	D1	D28	D1	D28
Average	18.0	14.1	13.4	12.1	3.1	1.8	0.9	0.0	0.6	0.2
Standard deviation	8.5	5.4	3.0	2.6	5.0	3.5	1.7	0.0	1.4	0.9
Minimum	12	9	9	9	0	0	0	0	0	0
Maximum	40	30	23	19	16	14	6	0	4	4
Percentage of variation (%)	-	-21.7	-	-9.9	-	-42.4	-	NA*	-	NA*
p value Significance	-	$p < 0.0001$ (S)	-	$p = 0.030$ (S)	-	$p = 0.019$ (S)	-		-	

CLINICAL DATA: ANTI-ACNE POTENTIAL

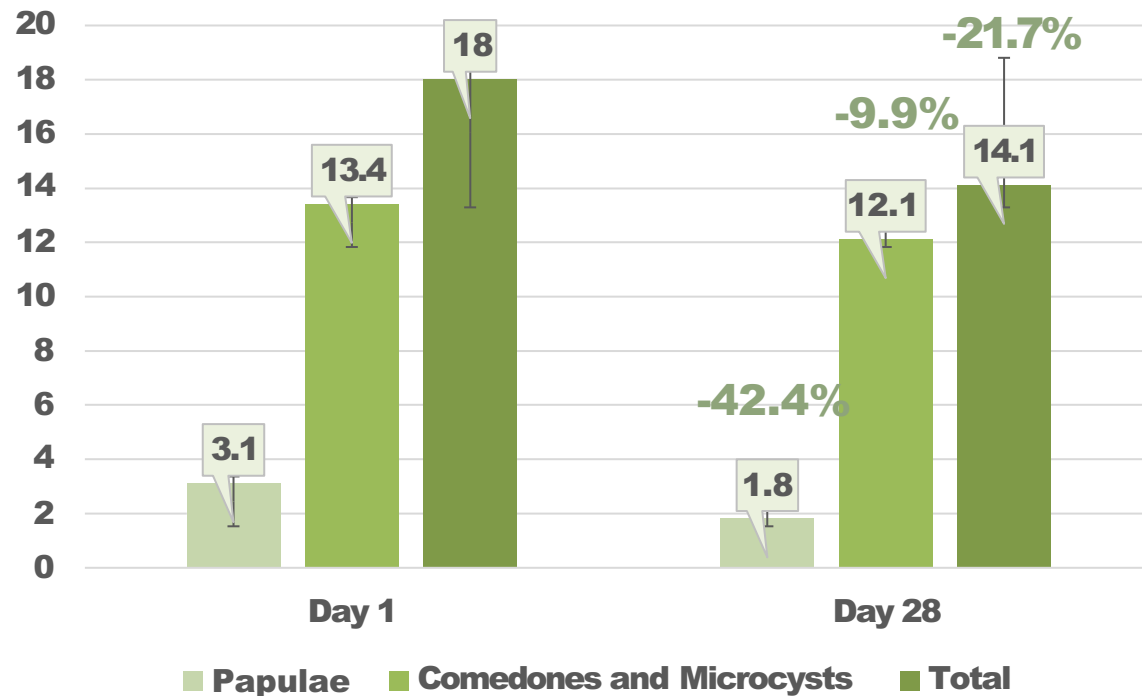
Reduction in Acne Severity:

- Data analysis from the clinical trial revealed a statistically significant reduction in the total score of acne lesions, including comedones, microcysts, and papules, after 28 days of use compared to the initial assessment on Day 1.

Tolerance and Comfort:

- Dermatological Tolerance:** Throughout the study period, no clinical signs of intolerance were observed among the participants.
- Sensory Feedback:** Volunteers reported no sensation of discomfort, indicating excellent tolerance and user comfort with the cream formulation.

REDUCTION IN ACNE SEVERITY



CLINICAL DATA: PICTURES



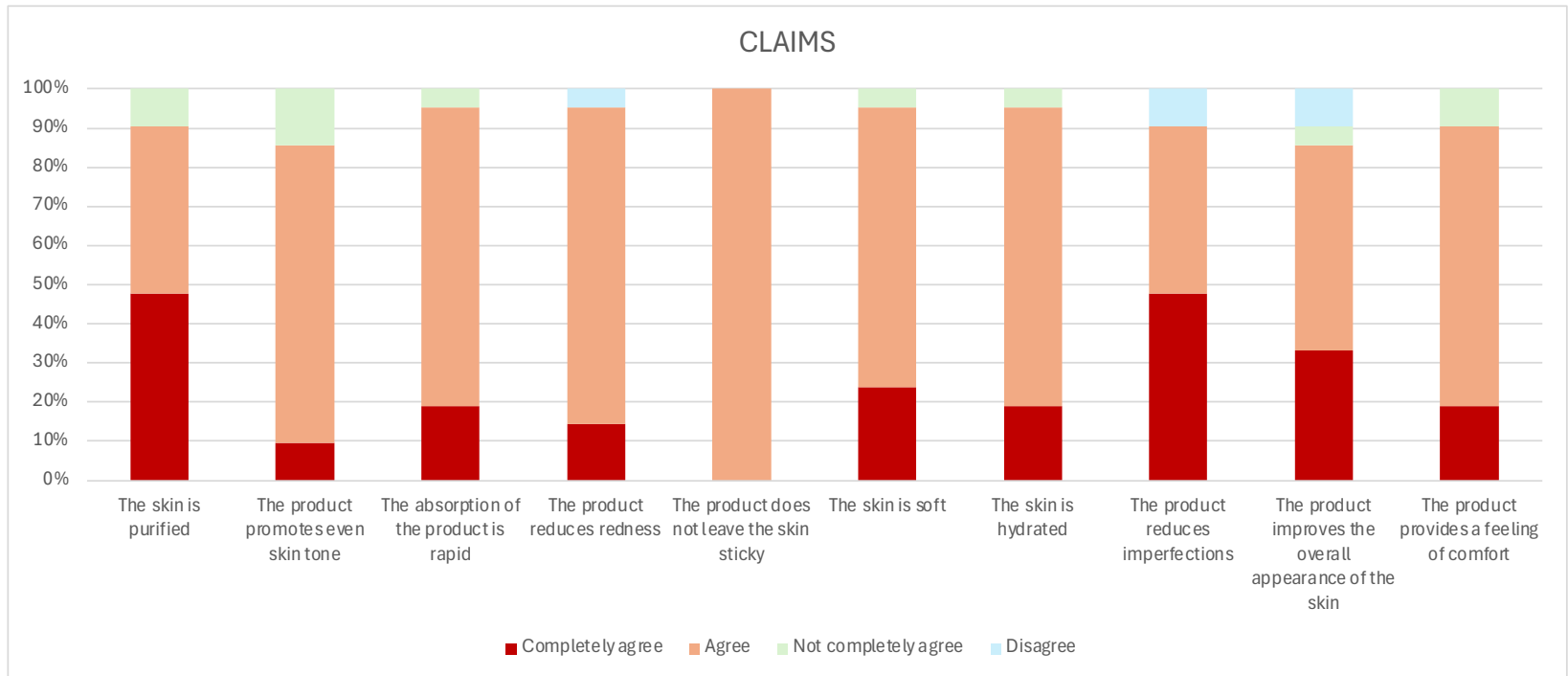
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Volunteer pictures:

Before (left) and after (right) 28 days of application twice daily of Asterol on the face of an 18 years old male volunteer.

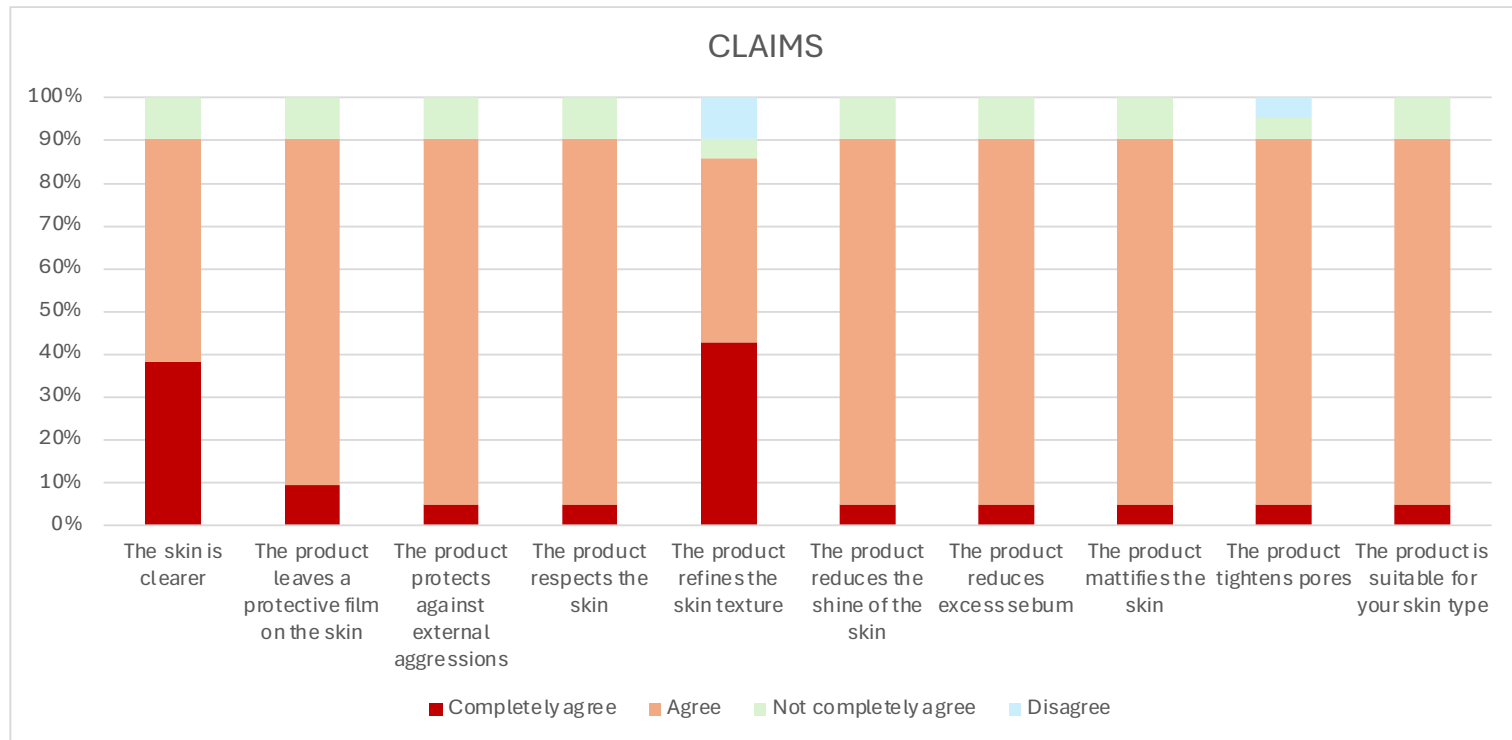
CLINICAL DATA: COSMETIC ACCEPTABILITY



Volunteer Feedback:

At the conclusion of the trial on Day 28, participants completed a questionnaire to evaluate the cosmetic acceptability of the cream, focusing on aspects such as texture, feel, and overall satisfaction with the product.

CLINICAL DATA: COSMETIC ACCEPTABILITY



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CONCLUSION:

Pharmacological Properties:

- **Anti-Inflammatory and Antibiotic Effects:** The aqueous extract of Aster Tataricus is characterized by its dual anti-inflammatory and antibiotic properties, making it an effective ingredient for acne treatment.

Clinical Study Outcomes:

- **Anti-Acne Potential:** The clinical trial demonstrated that the product has significant anti-acne capabilities, effectively reducing acne severity.
- **Dermatological Tolerance:** Exhibited excellent tolerance when used on mixed oily to oily facial skin types, without causing adverse reactions.
- **Cosmetic Acceptability:** The product was highly accepted among trial participants, noted for its favorable texture and performance, enhancing user satisfaction.

Benzoyl Peroxide

- ✓ Hyperkeratinization of the follicular infundibulum (+/-)
- ✓ Active against C. acnes

Salicylic Acid

- ✓ Hyperkeratinization of the follicular infundibulum
- ✓ Inhibit inflammation (+/-)

Sulfur

- ✓ Action on seborrhea

Aster Extract

- ✓ Action on seborrhea
- ✓ Hyperkeratinization of the follicular infundibulum (anti-IL-1 beta)
- ✓ Active against C. acnes
- ✓ Inhibit inflammation

INTERNATIONAL PATENT

International Patent Application:

Filed in France in 2021, this patent application covers the utilization of Aster Tataricus extracts for treating various skin pathologies and in cosmetic applications.

Expansion to Related Plants:

Additionally, the patent encompasses extracts from other plants within the same botanical family.

Novelty in Acne Treatment:

Supported by research findings, the application highlights the novelty and inventiveness of employing the plant extract for acne treatment.

PCT Filing:

On March 15, 2023, a Patent Cooperation Treaty (PCT) application with the reference EP2023/056558 was filed, further extending the protection of the innovation internationally.



CONCENTRATION



Asteral, *Aster Tataricus Extract*, is formulated at a concentration of 3% in glycerin, is designed for utilization at a final concentration of 1% in cosmetic formulations.

Effective Concentration in Final Product: The concentration of Aster Tataricus extract in the cosmetic end product is precisely calibrated at 0.03%.