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BIOLOGICAL EFFECTS OF SALICYLATE COMPOUNDS ON THE SKIN

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Abstract:

Salicylate compounds, a class of bioactive molecules derived from salicylic acid, play a pivotal role in contemporary dermatological therapy due to their multifaceted biological effects at the cutaneous level. This paper provides a comprehensive analysis of the mechanisms of action, therapeutic efficacy, and safety profile of salicylates in dermatological applications. At the epidermal level, salicylates exert pronounced keratolytic and comedolytic effects by solubilizing intercellular cohesion and reducing corneocyte adhesion within the stratum corneum. This facilitates controlled desquamation, enhances epidermal turnover, and promotes the clearance of follicular occlusions, making these compounds particularly valuable in the management of acne vulgaris, hyperkeratosis, and disorders of keratinization.

Beyond their exfoliative properties, salicylates demonstrate significant anti-inflammatory activity mediated through the inhibition of cyclooxygenase (COX-1 and COX-2) enzymes and subsequent downregulation of prostaglandin synthesis. Emerging evidence also suggests their involvement in modulating nuclear factor kappa B (NF-κB) signaling pathways, thereby attenuating the expression of pro-inflammatory cytokines and contributing to the reduction of erythema and edema in inflammatory dermatoses.

Additionally, salicylates possess mild antimicrobial and antifungal effects, further supporting their use in conditions such as seborrheic dermatitis and superficial infections. The pharmacokinetics and bioavailability of topical salicylates are influenced by formulation variables, including vehicle type, pH, and concentration, as well as by skin barrier integrity and anatomical site of application. While low to moderate concentrations are generally well tolerated, higher concentrations may induce local irritation, barrier disruption, or, in rare cases, systemic toxicity (salicylism), particularly when applied over large surface areas or compromised skin.

In conclusion, salicylate compounds represent a cornerstone of dermatological therapeutics, offering a synergistic combination of keratolytic, anti-inflammatory, and antimicrobial effects. Their continued clinical relevance is supported by both established evidence and ongoing research into novel delivery systems and optimized formulations aimed at maximizing efficacy while minimizing adverse effects.

KEY SALICYLATE COMPOUNDS

- Salicylic Acid**
The most studied salicylate; a lipophilic BHA.
- Acetylsalicylic Acid (Aspirin)**
An acetylated derivative with anti-inflammatory properties.
- Other Salicylates**
Including methyl salicylate, sodium salicylate, and polysalicylic acid.

HOW SALICYLATES ACT ON THE SKIN

Salicylate molecule

Stratum corneum
Exfoliation and desquamation

Epidermis
Penetration into pores

Dermis
Modulation of inflammation

Due to their lipophilic nature, salicylates penetrate the stratum corneum, dissolve intercellular lipids and promote exfoliation, while exerting multiple biological effects within the skin.

BIOLOGICAL EFFECTS

- KERATOLYTIC EFFECT**
Breaks down intercellular bonds in the stratum corneum, promoting exfoliation, reducing hyperkeratosis, unclogging pores and improving skin texture.
- ANTI-INFLAMMATORY EFFECT**
Inhibits cyclooxygenase (COX) activity and decreases the production of pro-inflammatory mediators (e.g., prostaglandins, cytokines), helping to reduce redness, swelling and irritation.
- ANTIMICROBIAL EFFECT**
Exhibits antibacterial and antifungal activity, particularly against *Cutibacterium acnes* and *Malassezia* species, supporting its use in acne and other inflammatory skin conditions.
- ANTIOXIDANT EFFECT**
Neutralizes free radicals and reduces oxidative stress, helping to protect skin cells from environmental damage and premature aging.
- SEBUM REGULATION**
Decreases sebum production and normalizes follicular activity, contributing to reduction of acne lesions and improved skin clarity.

CLINICAL BENEFITS

- Treats acne and prevents breakouts
- Unclogs pores and reduces blackheads
- Improves skin texture and tone
- Reduces scaling, thickening and psoriasis plaques
- Supports overall skin health and barrier function

COMMON USES

- Topical treatment of acne vulgaris
- Management of seborrheic dermatitis and dandruff
- Treatment of psoriasis and other hyperkeratotic disorders
- Keratolytic agent in cosmetic formulations (cleansers, toners, peels)
- Post-inflammatory hyperpigmentation and skin renewal protocols

SAFETY AND CONSIDERATIONS

- Use appropriate concentrations (0.5-2% for leave-on products)
- May cause dryness, irritation or peeling, especially in sensitive skin
- Use sunscreen during the day (increased photosensitivity)
- Avoid in children under 3 years old
- Do not combine with other strong exfoliants or irritants without professional guidance

BHA SALICYLATE 2% EXFOLIATING SERUM

BHA CLEANSER

SPF 30+