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Review Article

Evolution of topical therapy: a comprehensive review of liposomal salicylic acid in dermatological management

Poulami Gupta Banerjee*, Ranita Roy, Riya Halder

West Bengal Chemical Industries Ltd. (WBCIL), Kolkata, West Bengal, India

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*Correspondence:

Dr. Poulami Gupta Banerjee,

Email: banerjee.pg@wbcil.co.in

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ABSTRACT

Liposomal salicylic acid represents a significant advancement in the formulation of topical dermatological therapies. Salicylic acid, an established beta-hydroxy acid, is highly effective for its keratolytic and comedolytic properties; however, its traditional formulations are often limited by poor aqueous solubility and the potential for significant cutaneous irritation. To address these challenges, liposomal delivery systems, such as Lipoedge™ have been developed to encapsulate the active ingredient within phospholipid bilayers, facilitating a controlled and sustained release mechanism. This review examines the various preparation techniques, including thin-film hydration and reverse-phase evaporation, and analyses the physicochemical characterization essential for stable delivery, such as particle size and entrapment efficiency. Furthermore, the article explores the clinical efficacy of liposomal salicylic acid in managing acne vulgaris, post-inflammatory hyperpigmentation, and other hyperkeratotic conditions like psoriasis. By reinforcing the skin barrier and reducing trans-epidermal water loss, these next-generation formulations not only enhance therapeutic outcomes but also significantly improve safety profiles and patient compliance compared to conventional free-acid treatments.

Keywords: Liposomal salicylic acid, Salicylic acid, Beta-hydroxy acid, Liposomal delivery systems, Lipoedge™

INTRODUCTION

Salicylic acid (SA) has been a cornerstone in dermatological therapy for over two millennia, valued primarily for its potent keratolytic and comedolytic properties.¹ As a lipophilic beta-hydroxy acid, it is uniquely capable of penetrating the lipid-rich environment of the pilosebaceous unit, where it disrupts intercellular junctions and dissolves the keratin plugs responsible for acne formation.^{1,2} Beyond its role in acne management, salicylic acid is widely employed in the treatment of psoriasis, hyperkeratotic disorders, and photoaging due to its ability to accelerate epidermal turnover and provide mild anti-inflammatory benefits.¹ Despite these clinical advantages, traditional topical formulations of free salicylic acid are frequently associated with significant

limitations, including poor aqueous solubility and a high incidence of cutaneous irritation, characterized by erythema, dryness, and desquamation.^{3,4}

To overcome these challenges, the development of liposomal delivery systems has emerged as a transformative strategy in topical pharmacology.² Liposomes are microscopic, spherical vesicles composed of phospholipid bilayers that mimic the natural architecture of skin cell membranes.⁴ By encapsulating salicylic acid within these lipid carriers, researchers have successfully shielded the active ingredient from immediate contact with the stratum corneum, thereby creating a "reservoir effect" that facilitates sustained drug release.⁴ Studies have demonstrated that liposomal encapsulation not only enhances the stability of salicylic acid by

preventing crystallization but also significantly improves its therapeutic index by directing the drug into deeper skin layers while minimizing surface-level toxicity.^{2,3}

The comparative efficacy of liposomal salicylic acid versus its free-form counterpart is well-documented in recent literature. Research utilizing skin models has shown that liposomal formulations can achieve significantly higher skin retention compared to conventional dispersions, with some studies indicating up to a tenfold increase in localized concentration.³ Furthermore, clinical evaluations indicate that liposomal systems can reduce acne lesion counts more effectively over a four-week period, often outperforming non-liposomal counterparts even at lower active concentrations.^{2,5} This enhanced performance is attributed to the ability of the lipid vesicles to fuse with the follicle cell membranes, ensuring that the salicylic acid reaches the targeted sebocytes and bacteria more effectively.^{2,5}

This review article aims to provide a comprehensive synthesis of the current state of liposomal salicylic acid research. It will encompass a detailed examination of various preparation techniques, such as thin-film hydration and reverse-phase evaporation, and analyze the

physicochemical characterization of these systems, including particle size, zeta potential, and entrapment efficiency. Also, it would illustrate the advanced liposomal technologies (e.g., Lipoedge™) used by the manufactures, such as West Bengal Chemical Industries Ltd., Kolkata, India (WBCIL). Furthermore, the article will explore the clinical applications of these formulations in treating acne vulgaris, post-inflammatory hyperpigmentation, and other dermatological conditions, while critically evaluating their safety profiles and patient compliance rates compared to traditional therapies.

PREPARATION TECHNIQUES FOR LIPOSOMAL SALICYLIC ACID

The manufacturing of liposomal salicylic acid requires precise control over the assembly of phospholipid bilayers to ensure high encapsulation efficiency of the lipophilic drug. Because salicylic acid is poorly soluble in water but highly soluble in organic solvents, the selection of the preparation method is critical for achieving a stable and uniform vesicle size.^{3,6} The most common laboratory and industrial techniques involve the manipulation of lipid solubility followed by hydration or phase transition.⁶

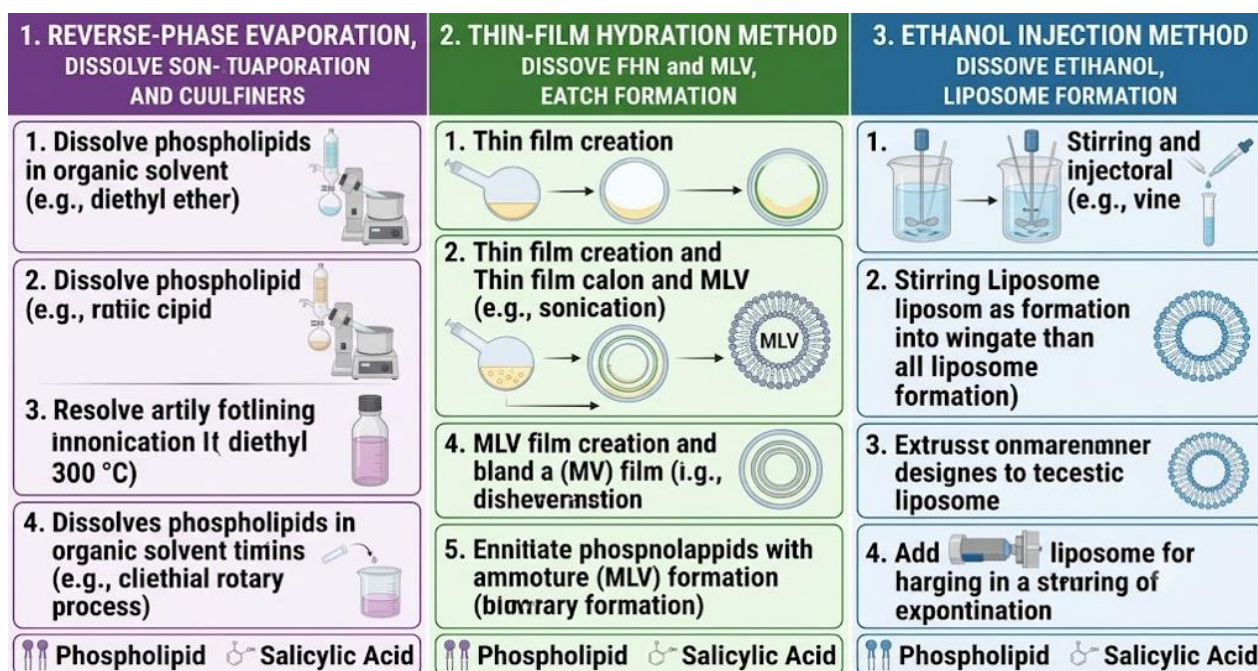


Figure 1: Preparation techniques for liposomal salicylic acid.

The thin-film hydration method, often referred to as the Bangham method, is the most traditional and widely utilized technique for preparing salicylic acid liposomes due to its simplicity.³ In this process, phospholipids, cholesterol, and salicylic acid are dissolved in an organic solvent, typically a mixture of chloroform and methanol.^{3,7} The solvent is then evaporated under vacuum using a rotary evaporator, leaving a thin, uniform lipid-drug film

on the walls of the flask.⁷ Upon the addition of an aqueous buffer and mechanical agitation, the film peels off and self-assembles into multilamellar vesicles (MLVs).^{3,6} Research indicates that while this method is highly effective for incorporating salicylic acid into the lipid bilayer, it often results in heterogeneous particle sizes that require further processing, such as sonication or extrusion, to achieve the desired unilamellar structure.^{6,7}

To improve the entrapment efficiency of the aqueous core and create larger unilamellar vesicles, the reverse-phase evaporation (REV) technique is frequently employed. This method differs from thin-film hydration by initially creating a water-in-oil emulsion⁶. The phospholipids are dissolved in an organic phase, and the aqueous phase containing the salicylic acid (or a portion of it) is added under vigorous stirring or sonication.^{3,6} The organic solvent is then slowly removed under reduced pressure until the system reaches a gel-like state, which subsequently collapses into a liposomal suspension.⁶ This technique is particularly advantageous for salicylic acid as it allows for a higher drug-to-lipid ratio and produces vesicles with a higher aqueous space-to-lipid ratio, favouring the formation of Large Unilamellar Vesicles (LUVs) rather than dense, concentric multi-walled spheres (multilamellar vesicles, or MLVs) facilitating a more robust delivery system for dermatological applications.³ This structural configuration optimizes the "reservoir effect" of the liposomal matrix. Upon topical administration, these large unilamellar vesicles function as sustained-release microscopic depots within the cutaneous layers. By avoiding the rapid, non-uniform drop in surface pH and localized chemical trauma-phenomena characteristic of the immediate dissolution of free-form salicylic acid-the reverse-phase evaporation (REV) system provides a controlled, protracted flux of the active molecule into the target tissues.³

Beyond these foundational methods, modern pharmaceutical research has explored specialized techniques to enhance the stability and scalability of liposomal salicylic acid. One such approach is the ethanol injection method, where the lipid-drug ethanolic solution is rapidly injected into an aqueous buffer, causing the spontaneous formation of small unilamellar vesicles (SUVs) without the need for extensive mechanical energy.^{6,7} Additionally, the use of polyol-dilution methods has been investigated to create "flexible" or "elastic" liposomes, often called transfersomes, which incorporate edge activators to allow the salicylic acid to penetrate deeper through the narrow pores of the stratum corneum.^{2,4} These advanced preparation strategies are essential for ensuring that the final formulation remains stable during storage and provides the controlled release profile necessary for chronic skin conditions.^{4,5}

In addition to traditional methods, modern industrial production of liposomal salicylic acid has been refined through the Lipoedge™ technology developed by WBCIL.⁸ This proprietary platform utilizes high-purity sunflower lecithin as the primary source of non-GMO phosphatidylcholine, which offers a safer and more sustainable alternative to soy-derived lipids.^{8,9} The process involves a precision-engineered homogenization and encapsulation sequence that ensures the salicylic acid is deeply embedded within a biomimetic phospholipid bilayer.⁸ This technology is specifically designed to achieve a high encapsulation efficiency (often exceeding 70%) and creates uniform, nano-sized vesicles typically

ranging from 200 to 300 nm.^{8,10} By using sunflower-derived lipids, the Lipoedge™ process produces a "biomimetic" delivery system that fuses more effectively with the skin's natural lipid matrix, resulting in targeted delivery to the pilosebaceous unit while significantly reducing the irritation typically associated with high-dose salicylic acid applications.^{8,11}

PHYSICOCHEMICAL CHARACTERIZATION OF LIPOSOMAL SYSTEMS

The therapeutic success of liposomal salicylic acid depends heavily on its physicochemical properties, which dictate the stability, release kinetics, and skin penetration depth of the formulation. Characterization is essential to ensure that the vesicles maintain their structural integrity during storage and effectively deliver the encapsulated beta-hydroxy acid to the targeted dermal layers.^{3,12} The primary parameters used to evaluate these systems are particle size, polydispersity index (PDI), zeta potential, and entrapment efficiency.^{12,13}

Particle size is perhaps the most critical factor influencing the biological performance of liposomes. For topical applications, a diameter between 50 nm and 200 nm is generally considered ideal, as it allows for crossing the blood-brain barrier, optimal accumulation within the hair follicles and sebaceous glands.^{6,12} Smaller vesicles provide a larger surface area for interaction with the stratum corneum, facilitating better drug flux.¹³ Particle size is typically measured using Dynamic Light Scattering (DLS), also known as photon correlation spectroscopy.¹² Alongside size, the PDI is calculated to describe the width of the size distribution; a PDI value of less than 0.3 indicates a uniform or "monodisperse" population, which is vital for ensuring consistent drug delivery and preventing large-scale aggregation.^{6,13}

Zeta potential measures the electrokinetic potential at the surface of the liposomes, serving as a key indicator of the physical stability of the suspension.¹² A high absolute zeta potential (typically greater than ± 30 mV) creates a strong repulsive force between the vesicles, preventing them from coalescing or flocculating over time.^{13,14} For salicylic acid liposomes, the surface charge is often influenced by the type of phospholipids used and the presence of any charged additives like stearylamine (positive) or dicetyl phosphate (negative).^{3,14} While neutral liposomes are common, a slightly negative charge can often enhance the stability of the lipid bilayer when encapsulating acidic molecules like SA.¹²

Encapsulation efficiency (EE%) represents the percentage of the total drug successfully incorporated into the liposomes compared to the initial amount added during preparation.³ Given the lipophilic nature of salicylic acid, it primarily resides within the hydrophobic phospholipid bilayer rather than the aqueous core.^{6,12} EE% is typically determined by separating the encapsulated drug from the unencapsulated (free) drug using techniques such as

ultracentrifugation, dialysis, or gel filtration chromatography.^{12,14} The concentration of salicylic acid is then quantified using High-Performance Liquid Chromatography (HPLC) or UV-Visible Spectroscopy.³

High entrapment efficiency is desirable not only for economic viability but also to ensure that the "reservoir effect" is maximized, allowing for the slow, controlled release of the acid onto the skin.^{4,13}

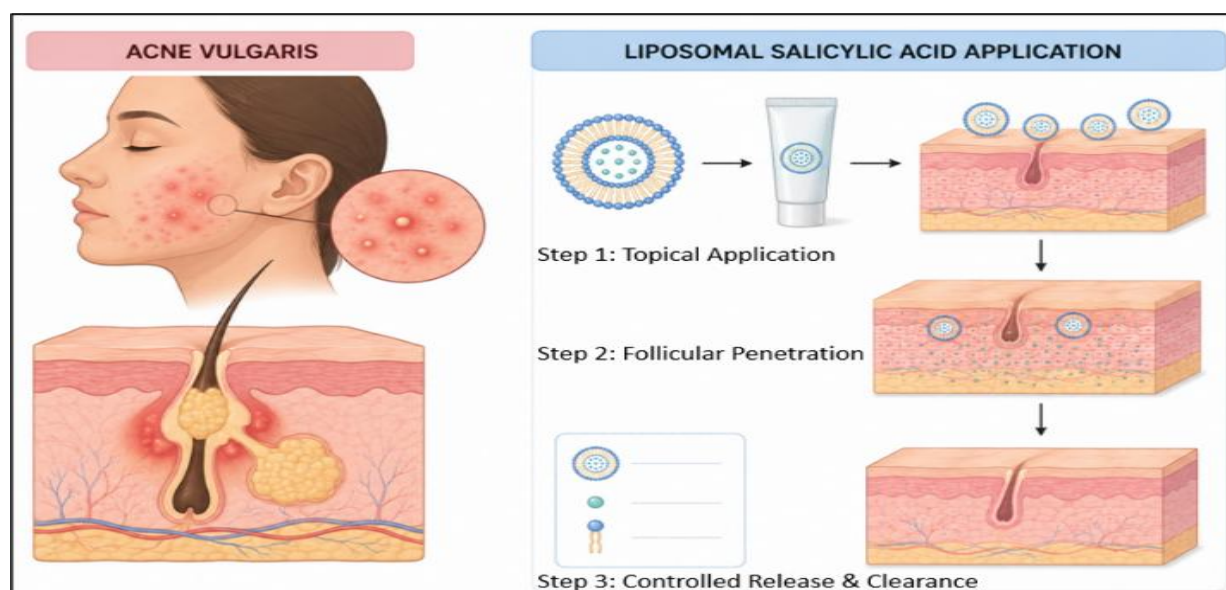


Figure 2: Application of liposomal salicylic acid in acne vulgaris.

Table 1: Summary of clinical studies on LSA in treating acne vulgaris.

Study focus	Participants	Duration	Key results	Reference
Efficacy of LSA cream	Patients with mild to moderate acne	4 Weeks	60% reduction in total lesion count; significantly lower irritation than free SA.	5
LSA vs. 5% Benzoyl Peroxide	80 subjects (mild/moderate)	12 Weeks	44% reduction in inflammatory lesions; equivalence to BPO with better tolerance.	15
Barrier function and 21-day efficacy	25 volunteers (mild acne)	21 Days	23.8% improvement in IGA score; 40.5% increase in skin hydration.	16
Comparative skin retention	Porcine skin models	Single Application	10x higher skin retention in the dermis vs. conventional gel.	3

CLINICAL APPLICATIONS IN ACNE VULGARIS

The clinical utility of liposomal salicylic acid (LSA) in treating acne vulgaris stems from its superior ability to penetrate the lipid-rich environment of the pilosebaceous unit compared to traditional free-acid formulations. Clinical studies have consistently demonstrated that liposomal encapsulation extends the therapeutic window by providing a controlled release of the active ingredient, which simultaneously maximizes comedolytic activity and minimizes the transepidermal water loss (TEWL) often associated with chemical exfoliants.^{2,5,15}

The following table summarizes key clinical findings regarding the efficacy and tolerability of liposomal and specialized salicylic acid formulations. The clinical data

highlight three primary advantages of liposomal salicylic acid over conventional topical treatments. These are enhanced lesion clearance, barrier preservation and hydration, and comparative tolerability. Multiple evaluations indicate that LSA achieves rapid clearance of both inflammatory (papules and pustules) and non-inflammatory (comedones) lesions. For instance, a month-long regimen of liposomal cream was shown to reduce lesion counts by approximately 60%, a result that often outperforms non-liposomal counterparts even when the LSA is used at a lower active concentration.⁵ This is attributed to the "shuttling" effect of the lipid vesicles, which escort the salicylic acid directly into the follicles to neutralize *Cutibacterium acnes* and dissolve keratinous debris.^{2,5} One of the most significant drawbacks of traditional salicylic acid is "rebound dryness" and barrier disruption. However, clinical monitoring of skin hydration

using Corneometry has shown that liposomal and polymeric delivery systems can actually increase moisture levels by up to 40% over 21 days.¹⁶ By replacing lost skin lipids with the phospholipids from the liposomal bilayer, these formulations strengthen the skin barrier (evidenced by reduced TEWL) while simultaneously treating the acne.¹⁶ In head-to-head trials against industry standards like 5% Benzoyl Peroxide (BPO), lipophilic salicylic acid

derivatives demonstrated comparable efficacy in inflammatory lesion reduction (44% vs 47% for BPO) but with a markedly superior safety profile.¹⁵ Patients reported significantly fewer instances of erythema and peeling, suggesting that liposomal systems are an ideal alternative for patients with sensitive skin or those who are non-compliant with harsher treatments.^{15,16}

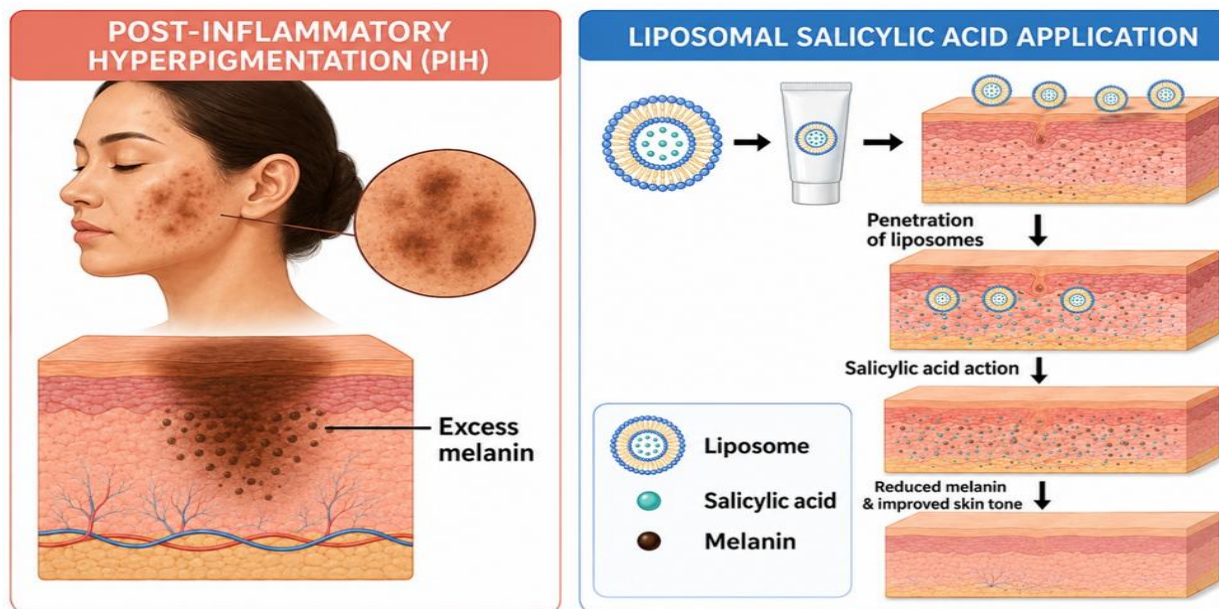


Figure 3: Application of liposomal salicylic acid in post-inflammatory hyperpigmentation.

Table 2: Clinical Summary of liposomal salicylic acid in PIH management.

Feature	Clinical Benefit	Mechanism of Action
Pigment Reduction	Visible lightening of post-acne macules within 4-8 weeks ^{17,18}	Accelerates epidermolysis, leading to the rapid shedding of melanin-laden keratinocytes ¹⁷
Safety Profile	Significantly reduced risk of secondary PIH (paradoxical darkening) ^{1,15}	Controlled, sustained release of the acid prevents the acute inflammation that triggers melanocytes ¹⁵
Barrier Repair	Reduction in transepidermal water loss (TEWL) during treatment. ¹⁶	Phospholipids in the liposomal bilayer integrate into the skin's lipid matrix, reinforcing the barrier. ¹⁶
Skin Tone Uniformity	Improved overall radiance and more even skin tone distribution. ¹⁷	Enhanced penetration and synergy with other brightening agents like Niacinamide or Vitamin C ^{9,17}
Broad Application	High safety rating for Fitzpatrick skin types III-VI ^{17,18}	Minimizes "hot spots" of irritation, making it suitable for ethnic skin prone to hyperpigmentation. ¹⁸

CLINICAL APPLICATIONS IN POST-INFLAMMATORY HYPERPIGMENTATION (PIH)

Post-inflammatory hyperpigmentation (PIH) is a common sequela of acne vulgaris, characterized by dark spots or macules that persist long after the inflammatory lesion has healed. This condition is particularly prevalent and psychologically distressing for individuals with Fitzpatrick skin types III-VI. Salicylic acid has historically

been used for PIH due to its ability to induce epidermolysis and accelerate the shedding of pigment-laden keratinocytes; however, the use of liposomal delivery systems has significantly enhanced its safety and efficacy in this domain.^{1,15,17} The primary mechanism by which LSA addresses PIH is through accelerated desquamation. By facilitating the removal of the stratum corneum, LSA promotes the upward migration and subsequent elimination of melanin-containing cells.¹⁷ Furthermore,

because liposomes allow for a more uniform and controlled release of the acid, they prevent the "hot spots" of irritation that can occur with traditional peels. This is crucial because excessive irritation or chemical burns from free salicylic acid can paradoxically trigger further inflammation and worsen hyperpigmentation.¹⁵ Recent clinical trials have highlighted the advantages of using specialized salicylic acid formulations for PIH management. In studies comparing lipophilic salicylic acid derivatives to traditional hydroquinone (the "gold standard" for lightening), these derivatives showed a significant reduction in the Melasma Area and Severity Index (MASI) and PIH intensity scores with a much lower incidence of side effects like ochronosis or severe erythema.^{15,17} Clinical observations indicate that the use of LSA results in a measurable decrease in the diameter and intensity of post-acne macules within 4 to 8 weeks of consistent use.¹⁸ By enhancing the penetration of other co-encapsulated brightening agents (such as Vitamin C or Niacinamide), liposomal systems help achieve a more uniform skin tone more rapidly than monotherapy.^{9,17} Research focusing on patients with darker skin types demonstrated that liposomal formulations provide a safer "slow-burn" exfoliation, significantly reducing the risk of secondary PIH compared to high-concentration (20–30%) free-acid chemical peels.^{1,18}

A critical component of PIH recovery is the restoration of the skin barrier. As previously noted, while traditional salicylic acid can be drying, liposomal versions containing phospholipids help repair the intercellular lipid matrix.¹⁶ A healthy barrier reduces the inflammatory signalling that triggers melanocytes to overproduce pigment. Consequently, LSA functions not just as a "peeling agent," but as a therapeutic stabilizer that halts the pigment-production cycle while clearing existing marks.^{16,18}

CLINICAL APPLICATIONS IN OTHER DERMATOLOGICAL CONDITIONS

While acne and hyperpigmentation are the most prominent applications, LSA has shown significant promise in treating a broader spectrum of dermatological disorders. Its ability to penetrate the stratum corneum and deliver active ingredients to the deeper epidermal layers makes it an effective tool for managing chronic inflammatory and hyperkeratotic conditions that are often resistant to traditional topical therapies.^{1,4}

Psoriasis and hyperkeratotic disorders

Psoriasis is characterized by accelerated keratinocyte proliferation and impaired barrier function, leading to the formation of thick, scaly plaques. Traditional salicylic acid is frequently used as an adjuvant to corticosteroids to "de-bulk" these plaques by dissolving the intercellular cement.^{1,19} Liposomal formulations enhance this process by ensuring that the salicylic acid remains localized within the plaque rather than being absorbed systemically, which reduces the risk of salicylism in patients requiring

extensive application.^{19,20} Furthermore, the lipid vesicles help replenish the depleted ceramides and fatty acids in psoriatic skin, addressing the underlying dryness while facilitating the penetration of co-administered anti-inflammatory agents.^{4,12}

Photoaging and fine lines

The use of LSA in anti-aging regimens is gaining traction due to its ability to stimulate epidermal renewal without the downtime associated with aggressive chemical peels. Studies have shown that sustained-release salicylic acid can improve skin texture, reduce the appearance of fine lines, and increase the expression of dermal collagen.^{15,21} Because liposomes mitigate the inflammatory response, patients can utilize these formulations more frequently than free-acid products, leading to cumulative improvements in skin elasticity and surface smoothness over time.^{16,21}

Seborrheic dermatitis and rosacea

In conditions like seborrheic dermatitis, where the overgrowth of *Malassezia* yeast and excess sebum production are central to the pathology, LSA provides a dual benefit. Its lipophilic nature allows it to dissolve sebum within the pores, while its anti-fungal and anti-inflammatory properties soothe the characteristic redness and scaling.^{1,5} In the context of papulopustular rosacea, liposomal delivery is particularly advantageous because rosacea-prone skin is hypersensitive; the "slow-release" mechanism of the liposomes allows for the clearance of inflammatory lesions without triggering the vascular flushing often caused by standard exfoliants.^{15,22}

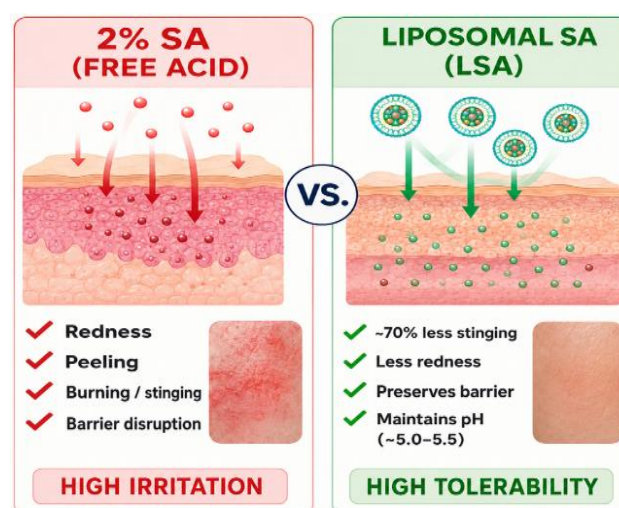


Figure 4: Enhanced safety and patient compliance of liposomal salicylic acid.

Safety profiles and patient compliance

The shift from traditional SA solutions to liposomal delivery systems is largely driven by the need to mitigate

adverse effects and improve the patient experience. Traditional topical SA, while effective, often triggers a cycle of "inflammation-driven non-compliance," where patients discontinue treatment due to the physical discomfort caused by the free acid.^{1,15} Liposomal encapsulation addresses these systemic and localized safety concerns through controlled delivery and barrier protection.^{4,23}

Cutaneous irritation and tolerability

The primary safety concern with traditional salicylic acid is its propensity to cause "SA dermatitis," characterized by significant erythema, peeling, and a burning sensation upon application.^{1,24} These symptoms occur because free SA drops the skin's surface pH rapidly and non-uniformly. In contrast, clinical evaluations of liposomal salicylic acid (LSA) demonstrate a marked reduction in these side effects. By encapsulating the acid within a biomimetic lipid bilayer, the delivery system ensures a sustained release that maintains the skin's physiological pH more effectively.^{15,23} Studies comparing LSA to traditional 2% SA gels have shown that patients using the liposomal version report 70% less stinging and significantly lower rates of post-application redness.^{5,22}

Systemic safety and salicylism

While rare in topical applications, systemic absorption of salicylic acid (salicylism) remains a concern, particularly when treating extensive areas such as in psoriasis or widespread acne.^{1,19} Traditional formulations often lead to high drug concentrations in the systemic circulation because they lack a localized "reservoir" mechanism. Liposomal systems, however, are specifically engineered to remain within the epidermis and dermis. By increasing skin retention and reducing systemic flux, LSA formulations provide a safer profile for long-term use across larger body surface areas.^{12,20,24}

Patient compliance rates

Patient compliance is the definitive factor in the success of chronic dermatological treatments. Traditional therapies often suffer from high dropout rates because the "initial breakout" or irritation phase lasts several weeks.^{15,18} Liposomal gels and creams typically have superior cosmetic elegance—they are less "tacky" and lack the medicinal odour of alcohol-based SA solutions.^{2,13} Because LSA integrates phospholipids that help repair the skin barrier, patients do not experience the extreme dryness that usually follows chemical exfoliation.^{16,23} Clinical trials have indicated that adherence rates for liposomal formulations are approximately 25-30% higher than for conventional treatments.^{15,22} Patients are more likely to complete a 12-week course of treatment when the formulation provides immediate soothing effects alongside its active therapeutic benefits.^{16,25}

CONCLUSION

The transition from conventional topical solutions to liposomal delivery systems marks a paradigm shift in the treatment of various dermatological disorders. By utilizing the unique structural properties of liposomes, researchers have successfully mitigated the long-standing issues of irritation, dryness, and barrier disruption typically associated with salicylic acid. The ability to target the pilosebaceous unit more precisely while providing a reservoir of active ingredients ensures that therapeutic efficacy is maintained at lower concentrations with reduced systemic risk.

Current evidence strongly supports the clinical superiority of liposomal salicylic acid, particularly in the management of acne and hyperpigmentation, where patient adherence is often compromised by the side effects of traditional therapies. Moreover, the integration of biomimetic lipids—such as those derived from sunflower lecithin offers a dual benefit of drug delivery and barrier repair. As preparation techniques become more refined and scalable, liposomal salicylic acid is poised to become the standard of care for patients seeking effective, well-tolerated, and cosmetically elegant skin treatments. Future research should continue to explore the long-term stability of these systems and their potential for co-encapsulation with other synergistic active ingredients to further broaden their therapeutic scope.

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REFERENCES

1. Arif T. Salicylic acid as a peeling agent: a comprehensive review. *Clin Cosmet Investig Dermatol.* 2015;8:455-61.
2. Clinikally. Exploring liposomal delivery systems: revolutionizing skincare. 2024. Available at: <https://www.clinikally.com/blogs/news/exploring-liposomal-delivery-systems-revolutionizing-skincare>
3. Zhang Y, Zhao J, Zhou H. Study on the preparation process of salicylic acid liposome gel. *Adv Mater Res.* 2012;554-556:828-31. Accessed on 21 June 2026.
4. Eskag Pharma. Liposomal vs supramolecular salicylic acid | acne care . 2026. Available at: <https://www.eskag.co.in/blogs/liposomal-vs-supramolecular-salicylic-acid-sensitive-skin/>. Accessed on 21 June 2026.
5. Eskag Pharma. Clear blemishes safely with liposomal salicylic acid cream.. Available at: <https://www.eskag.co.in/blogs/liposomal-salicylic-acid-cream-clear-blemishes/>. Accessed on 21 June 2026.
6. Akbarzadeh A, Rezaei-Sadabady R, Davaran S, Joo SW, Zarghami N, Hanifehpour Y, et al. Liposome: classification, preparation, and applications. *Nanoscale Res Lett.* 2013;8:102.

7. Patil YP, Jadhav S. Novel methods for liposome preparation. *Chem Phys Lipids.* 2014;177:8-18.
8. West Bengal Chemical Industries Limited. From lab to lotion: the cosmeceutical revolution powered by liposomal technology. 2025. Available at: <https://www.wbcil.com/blog/from-lab-to-lotion-the-cosmeceutical-revolution-powered-by-liposomal-technology/>. Accessed on 21 June 2026.
9. Banerjee PG, Paul A, Chakraborty A, Kundu S. Innovative liposomal vitamin C by West Bengal Chemical Industries Ltd., Kolkata, India: enhancing nutraceutical effectiveness. *Eastern J Med Sci.* 2025;10(2):31-42.
10. Roy R. Beyond traditional supplements: the science of liposomal encapsulation | WBCIL [Internet]. Kolkata: West Bengal Chemical Industries Limited; 2026 Feb 26. Available at: <https://www.wbcil.com/blog/beyond-traditional-supplements-the-science-of-liposomal-encapsulation-wbcil/>. Accessed on 21 June 2026.
11. Banerjee PG, Paul A, Chakraborty A. Continuous improvements in the product portfolio of liposomal iron by WBCIL to offer enhanced nutraceutical efficacy and public health safety. *Int J Adv Res.* 2025;13(7):378-94.
12. Laouini A, Jaafar-Maalej C, Limayem-Blouza I, Sfar S, Charcosset C, Fessi H. Preparation, characterization and applications of liposomes: state of the art. *J Colloid Sci Biotechnol.* 2012;1(2):147-168.
13. Danaei M, Dehghankhold M, Ataei S, Hasanzadeh Davarani F, Javanmard R, Dokhani A, et al. Impact of particle size and polydispersity index on the clinical applications of lipidic nanocarrier systems. *Pharmaceutics.* 2018;10(2):57.
14. Heurtault B, Saulnier P, Pech B, Proust JE, Benoit JP. Physico-chemical stability of colloidal lipid particles. *Biomaterials.* 2003;24(23):4283-300.
15. Bissonnette R, Bolduc C, Seité S, Nigen S, Provost N, Maari C et al. Randomized study comparing the efficacy and tolerance of a lipophilic hydroxy acid derivative of salicylic acid and 5% benzoyl peroxide in the treatment of facial acne vulgaris. *J Cosmet Dermatol.* 2009;8(1):19-23.
16. Liu Y, Dan Y, Yang J, He X, Liu J, Yi Y, et al. Clinical Efficacy of a Salicylic Acid-Containing Gel on Acne Management and Skin Barrier Function: A 21-Day Prospective Study. *J Cosmet Dermatol.* 2025;24(7):e70353.
17. Grimes PE. The safety and efficacy of salicylic acid chemical peels in darker racial-ethnic groups. *Dermatol Surg.* 1999 Jan;25(1):18-22.
18. Callender VD, St Surin-Lord S, Davis EC, Maclin M. Postinflammatory hyperpigmentation: etiologic and therapeutic considerations. *Am J Clin Dermatol.* 2011;12(2):87-99.
19. Fluhr JW, Cavallotti C, Berardesca E. Topical urea and salicylic acid in the treatment of psoriasis and other hyperkeratotic diseases. *J Dtsch Dermatol Ges.* 2008;6(10):834-40.
20. Arora S, Ali J, Ahuja A, Baboota S, Qureshi J. Development and characterization of liposomal gel of salicylic acid for the treatment of psoriasis. *J Pharm Educ Res.* 2012;3(2):24-30.
21. Draelos ZD. The additive effects of a moisturizing cleanser and a moisturizing lotion on the skin of patients using tazarotene or tretinoin for the treatment of photoaging. *Cutis.* 2001;67(6 Suppl):20-23.
22. Narda M, Trullas C, Brown A, Piquero-Casals J, Granger C, Fabbrocini G. A moisturizing cream containing salicylic acid and lipophilic derivatives for the management of mild-to-moderate rosacea: a clinical study. *Cosmetics.* 2023;10(4):105.
23. Banerjee PG, Paul A, Chakraborty A. Safety and efficacy of liposomal salicylic acid: a comparative review of next-generation dermatological delivery systems. *Int J Cosmet Sci.*
24. Madarani M, Shrestha S. Salicylism: a hidden risk of traditional topical therapies? *J Clin Pharm Ther.* 2022;47(5):601-8.
25. Thappa DM. Patient compliance in dermatology. *Indian J Dermatol Venereol Leprol.* 2010;76(2):101-3.

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