

TRANSBILOSOMAL FORMULATIONS

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Abstract: Transbilosomal formulations are advanced lipid-based nanocarriers developed by combining the advantages of bilosomes and transferosomes. They are composed of phospholipids, bile salts, surfactants (edge activators), and cholesterol, which together provide high flexibility, stability, and enhanced drug permeation. Transbilosomes improve the bioavailability of poorly soluble drugs and facilitate drug delivery through oral, transdermal, ocular, and nasal routes. They are increasingly used for targeted and controlled drug delivery because of their ability to overcome biological barriers

Keywords: Transbilosomal formulations, Lipid-based nanocarriers, Bilosomes, Transferosomes, Targeted drug delivery, Enhanced drug permeation.

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INTRODUCTION

Many conventional dosage forms suffer from poor bioavailability due to low drug solubility, enzymatic degradation, and poor permeability. Vesicular drug delivery systems such as liposomes, niosomes, transferosomes, and bilosomes were developed to overcome this limitation [1].

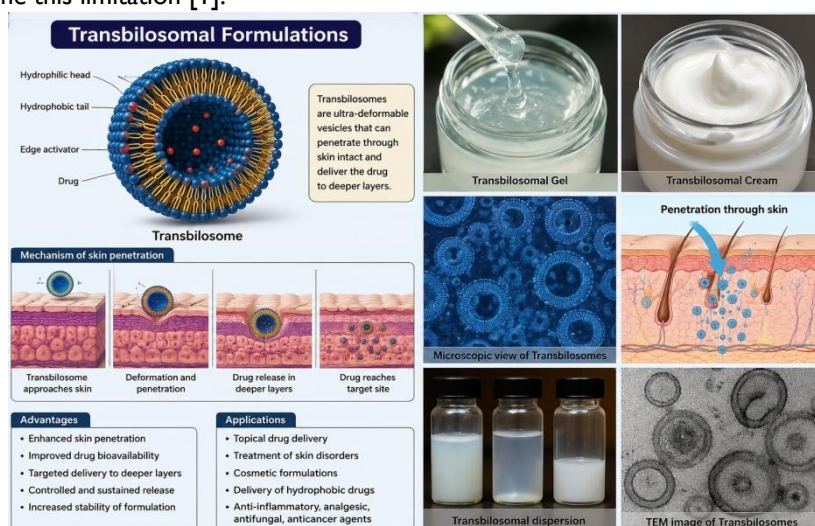


Figure 01. Transbilosomal Formulations

Transbilosomes are a novel vesicular system formed by incorporating bile salts into highly deformable transferosomes. This combination enhances vesicle stability and penetration through biological membranes, making transbilosomes suitable for both systemic and localized drug delivery [2].

Bile salts – Increase stability and improve permeability.

Edge activators (Tween 80, Span 80, Sodium cholate) – Provide elasticity.

Drug – Entrapped in the aqueous core or lipid bilayer.

Working Principle

- Drug is encapsulated inside vesicles.

- interact Vesicles with biological membranes.
- Flexible vesicles penetrate through the membrane.
- Drug is released in a controlled manner.
- Improved absorption and bioavailability [3].

IMPORTANCE [4-5]

- Improved oral bioavailability.
- Enhanced skin permeation.
- Protection of drugs from degradation.
- Controlled and sustained drug release.
- Increased drug stability.
- Suitable for hydrophilic and lipophilic drugs.
- Reduced dosing frequency.
- Better patient compliance.

WIDE APPLICATIONS [6-7]

- Transbilosomes are used for:
- Oral delivery of poorly soluble drugs.
- Transdermal drug delivery.
- Ocular drug delivery
- Nasal drug delivery.
- Vaccine delivery.
- Delivery of proteins and peptides.
- Anticancer drug delivery.
- Herbal medicine delivery.
- Antifungal and antibacterial therapy.
- Cosmetic and dermatological preparation

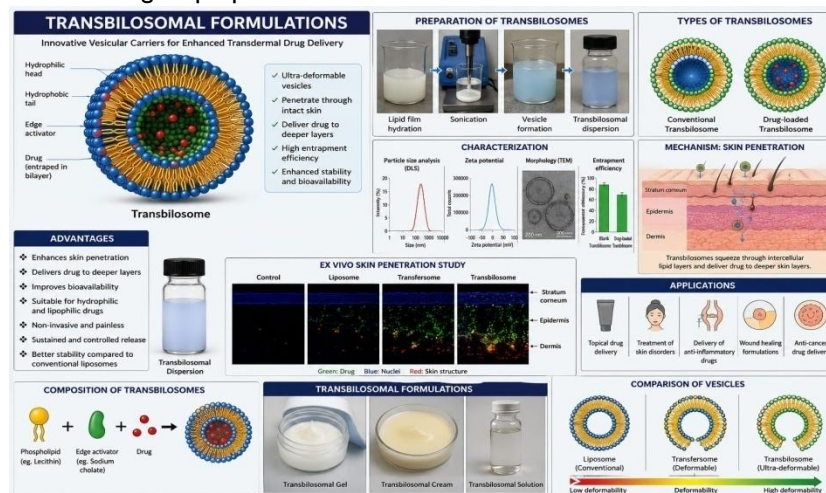


Figure 02: Applications of Transbilosomes

DRAW BACKS (LIMITATIONS)

Complex formulation – Transbilosomes contain phospholipids, bile salts, edge activators, and cholesterol, making formulation optimization difficult.

Physical instability – Vesicles may undergo aggregation, fusion, or drug leakage during storage, reducing shelf life.

High production cost – Specialized lipids, surfactants, and manufacturing processes increase formulation costs.

Difficult scale-up – Large-scale industrial production with consistent quality and reproducibility remains challenging.

Possible skin irritation – Bile salts and surfactants (edge activators) may cause irritation or toxicity, especially at high concentrations [8].

Batch-to-batch variation – Differences in vesicle size, zeta potential, and drug entrapment can affect product quality.

Storage sensitivity – Stability is affected by temperature, pH, light, and oxidation of phospholipids.

Limited clinical data – Most studies are preclinical, with limited human clinical trials available.

Regulatory challenges – Lack of standardized manufacturing and quality control guidelines delays commercialization.

Drug compatibility issues – Not all drugs can be efficiently encapsulated or remain stable within transbilosomal vesicles [9-10].

MODELS

1. Thin Film Hydration Method

Lipids dissolved in organic solvent.

Solvent evaporated to form thin film.

Hydration with bile salt solution.

Sonication reduce vesicle size [11-12].

2. Ethanol Injection Method

Lipids dissolved in ethanol.

Injected into aqueous phase containing bile salts.

Formation of nano-vesicles.

3. Reverse Phase Evaporation Method

Water-in-oil emulsion prepared.

Organic solvent removed.

Vesicles formed after evaporation.

4. Hot Homogenization Method

Lipids melted.

Mixed with aqueous phase.

Homogenized at high speed.

Vesicles formed on cooling [13-14].

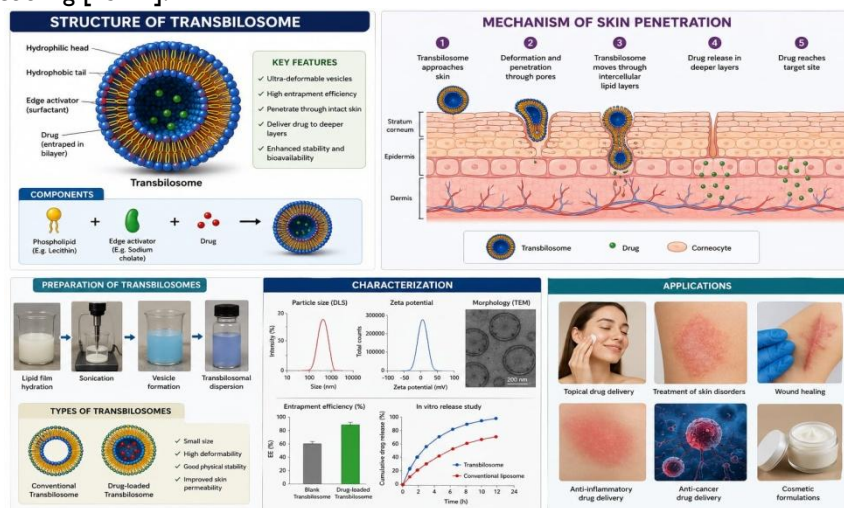


Figure 03: Mechanism of Skin Penetration

CONCLUSION

Transbilosomal formulations represent a promising and innovative vesicular drug delivery system that combines the flexibility of transferosomes with the stabilizing and permeation-enhancing properties of bile salts. Their ability to improve drug encapsulation, membrane penetration, stability, and controlled drug release makes them suitable for the delivery of both hydrophilic and lipophilic drugs through oral, transdermal, ocular, nasal, and other routes. Various preparation techniques, including thin-film hydration, ethanol injection, reverse-phase evaporation, and hot homogenization, provide opportunities to optimize vesicle characteristics and drug-loading efficiency. Despite their significant advantages, transbilosomes face challenges such as formulation complexity, physical instability, high production costs, scale-up difficulties, possible irritation, batch-to-batch variability, and limited clinical evidence. Therefore, further research is required to optimize their composition, improve long-term stability, establish standardized manufacturing methods, and evaluate their safety and therapeutic efficacy through well-designed clinical studies. Overall, transbilosomal formulations have considerable potential as advanced drug delivery carriers and may contribute to the development of more effective, stable, targeted, and patient-friendly therapeutic systems.

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CONFLICT OF INTEREST

Nil

INFORMED CONSENT

Not applicable

ETHICAL STATEMENT

Not Applicable.

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