

# Chapter 6

## Transfersomes and Protransfersome: Ultradeformable Vesicular System

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### ABSTRACT

*Vesicular system brings several possible advantages over conventional route of drug delivery system. Formulation of system to administered via transdermal is an attractive option because this route is suitable and safe. Transfersomes is one of vesicular system which possesses a single chain surfactant as it offers ultra deformation property which provides better penetration. Vesicles of hydrophobic and hydrophilic moieties can be formulated together and as a result can deliver drug molecules with wide range of solubility. Problems of drug leakage and low entrapment could be overcome in this system. Materials which are widely used in the formulation of it are various phospholipids, surfactants, alcohol, dye and buffering agent. These systems can deform up to 5 times lesser than its original size to pass through narrow constriction without showing drug leakage. These are more flexible and adjustable than that of liposomes thus can be used to carry drugs across the biological membrane, such as skin. It can act as a carrier for wide variety of drugs.*

### INTRODUCTION

#### History

The German company IDEA AG firstly introduced transfersome vesicular system and it is the registered trademark of this company which is being used as proprietary drug delivery technology. Gregor Cevc defined the term transfersome and described the concept related to it in broad sense (Cevc, 1991). Transfersome is an ultradeformable, highly flexible and stress-responsive, complex system. The name

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means “carrying body”, and is derived from the Latin word ‘transferre’, meaning ‘to carry across’, and the Greek word ‘soma’, for a ‘body’ (Walve et al., 2011). Transfersomes are ultradeformable vesicles; possess an aqueous core which is surrounded by the composite lipid bilayer. Transfersomes are inter-dependent of their composition and shape; it makes the system as self-regulating and self-optimizing. Thus, it is ready to cross various barriers of skin very efficiently. It targets drug via non-invasive route to specific site as well as releases the later in sustained manner to show therapeutic effect (Nanda et al., 2005). Transfersomes have stability problems, to overcome stability problem the more stable vesicular system is developed in relation to transport of drug, molecules, proteins and other drug moieties via transdermal route, this new vesicular system is called as Pro-transfersome. Pro-ultraflexible lipid vesicles called as pro-transfersomes, they possess better stability in comparison to transfersome vesicular systems they have ability to absorb water from the different layers of skin. Pro-transfersomes are more stable than conventional vesicular systems (Gupta et al., 2011).

In the new era, the vesicular type of approach have been used as an option because of their wide applications such as membrane biology, diagnostic techniques, immunology, and nowadays genetic technology thus promoted as a best system for sustained release and controlled release of drug through transdermal route, as it has number of advantages such as biodegradation, lack of toxicity, encapsulating capacity for hydrophilic as well as lipophilic molecules, prolonging the existence of drug in the body by encapsulating drug in vesicular system. It also offers the advantage of targeting of drug to specific organs and tissues, it reduces the toxicity of drug and most important it increases drug bioavailability. Vesicles because of their unique structure have a capacity to entrap both the types of drugs such as lipophilic, hydrophilic, amphiphilic and charged hydrophilic drugs. Transfersome and pro-transfersome is a vesicular system in which an aqueous filled core surrounded by lipids and surfactant arranges it into bilayer system. The concentration of aqueous system is increased, and then multi concentric bilayers can be formed. Entrapment of hydrophilic drugs into the internal aqueous environment while other drug of amphiphilic, lipophilic nature finds a place into bilayered wall and the hydrophobic forces as well as electrostatic forces are involved in it (Bain et al., 1993).

Transdermal route is convenient and safe route of administration so it is best approach to deliver the drug at specific site. Transfersomes and pro-transfersomes have number of advantages in comparison to conventional routes such as these avoid first pass metabolism, predetermined and longer duration of activity, reducing side effects, use of lesser half-life drugs, improving pharmacological response, drug levels fluctuation is avoided, variations in inter-and intra-patient is reduced, and lastly the patient compliance is improved (Cevc et al., 1997). Now research is oriented towards applying physical and chemical approaches in order to raise the drug transfer through skin, the approaches available are as follows:

1. By using penetration enhancers,
2. Enhancers,
3. Iontophoresis,
4. Sonophoresis, and
5. Vesicular carriers such as lipid vesicles and niosomes (Chapman and Walsh, 1998).

Transfersomes and pro-transfersomes were formulated with the main objective to deliver the drug into or through skin in order to show therapeutic response at predetermined rate. Transfersomes and pro-transfersomes are ultradeformable vesicles and it takes advantage of phospholipid as composition material to carry drug. These are more elastic in nature in comparison to other vesicle systems (e.g. li-

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