Chapter 14
Surfactant-Based Anhydrous Nano Carrier System for Poorly Aqueous Soluble Anti-Cancer Drugs

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ABSTRACT

Around 40% of new chemical entities and drugs are lipophilic or poor aqueous soluble in nature. Among them many anti-cancer drugs are also consist lipophilic properties. Available poorly water soluble anti-cancer drugs are paclitaxel, etoposide, and docetaxel. To get better stability of those anti-cancer drug via encapsulation and searching suitable carrier system for the controlled release, design and development requires of anhydrous nano carrier system. However, to deliver and entrapment of these kind of anti-cancer drugs are very essential with avoidance of water free preparation to get suitable controlled release application and achieve targeting site. The primary objective of proposed chapter is to develop and design novel stable anhydrous or non-aqueous nano emulsion carrier system and provide suitable carrier system for poorly aqueous soluble anti-cancer drugs. Another important aim is to design and develop better stabilizing agent by combining different type of surfactant, co-surfactant, and co-solvent.

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INTRODUCTION

The traditional drug delivery system is very useful and popular with a variety of advantages among physicians, surgeons and patients. But there are some drawbacks of the traditional drug delivery system which can overcome by adapting controlled drug delivery system(Patra, 2018).Controlled carrier provides reduced dosing frequency for patients with controlled release. In nutshell-controlled drug delivery carrier systems are patient compliance. There are many advantages and some disadvantages of controlled drug delivery system(Tiwari, 2017). In the past few decades, growth of controlled drug delivery system has been very rapid. Which has mainly worked on the dispersion system as it can popularly useful as oral, topical and parenteral. The surfactant based controlled dispersion system consists of microemulsion, nanoemulsions, multiple emulsions, submicron emulsions, and anhydrous nanoemulsion, of which anhydrous nanoemulsion is different from other controlled dispersions as it does not use water phase(Jaisawal, 2015).Anhydrous nanoemulsions are rationally nano carrier system to deliver a poorly aqueous soluble drug in controlled manner and system stabilized with various mixture and combination of surfactant (Verma, 2011). The special feature of Anhydrous Nanoemulsion is that it easily ingests water-insoluble drug due to absence of water phase in system. Other controlled delivery systems are unable to do for poorly aqueous soluble drug. There are many types of controlled drug carriers available at present and research is going on in a positive direction, looking at the additional potential in the future beyond that, then why the need to develop surfactant based nano carrier system (Verma, 2017). Answer would be around 40 percentage new chemical entities and drugs are lipophilic or poor aqueous solublein nature. Among them many anti-cancer drugs are also consist lipophilic properties. Available poorly water-soluble anti-cancer drugs are paclitaxel, etoposide and docetaxel (Narvekar, 2014). To get better stability and protection of those anti-cancer drug via encapsulation and searching suitable carrier system for the controlled release, design and development requires of anhydrous nano carrier system(Din, 2017). However to deliver and entrapment of these kind of anti-cancer drugs are very essential with avoidance of water phase preparation to get suitable controlled release application and achieve targeting site. Primary objective of chapter is to develop and design novel stable surfactant based nano carrier system i.e. anhydrous or non-aqueous nanoemulsion and provide suitable carrier system for poorly aqueous soluble anti-cancer drugs (Olusanya, 2018). Other important aim is to design and develop better stabilizing agent by combining different type of surfactant, co-surfactant and co-solvent for anhydrous nanoemulsion.

Various advantages of surfactant based nano carrier system i.e. Anhydrous Nanoemulsion makes it different from others and more useful (Kour, 2016). They are:

1. Minimize drug degradation and loss via encapsulation and entrapment
2. Prevent harmful side-effects by maintain therapeutic index zone
3. Increases drug bioavailability and the fraction of the drug accumulated in the required zone.
4. Controlled and sustained release of drug
5. Solubilization of poorly aqueous soluble anti-cancer drugs in to water free dispersion system
6. Minimum size and larger surface area
7. Stability over an extended period of time
8. Avoidance of phase separation, minimize toxic effect and adverse reaction.