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MATERIALS FOR BIOMEDICAL ENGINEERING

ORGANIC MICRO AND NANOSTRUCTURES



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CHAPTER

Poly(lactide-co-glycolide)-based Nanogel: Concept and Functions

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12.1 Introduction

Targeted drug delivery systems have utilized poly(lactide-co-glycolide) (PLGA) nanogel as a carrier for the drugs, proteins, vaccines, and nucleotides for site-specific targeting. The advantages of PLGA nanogels as a nanocarrier shows sustained release, avoid drug degradation, and widely explore the advent in cancer chemotherapy. In context to the cancer, defective capillaries and impaired lymphatic drainage exhibited by the cancer or tumor micro environment. PLGA nanogel are delivered by various route like oral, intravenous, topical etc in which EPR (Enhanced permeation and retention mechanism plays key role in effective tumor targeting (Jain, 1987). These EPR effects assist nanogels toward tumor sites.

PLGA nanogels is proved as a successful and optimistic carrier but also possess some of the negative aspect in account like prolong release of the PLGA nanogels is basis to get the maximum EPR effect, but it failed to release the drug by a process called opsonization by which the nanogel carrier is rapidly discarded by circulation. There is a need of development of PLGA based nanogel and micelles system for the better targeting and achievement of desired therapeutic effect. Various factors diminish the biodistribution pattern of the nanogels resulting in reduced therapeutic potential and pharmacological activity. Cellular uptake improves by the cationic nanogels through the surface charge interaction mechanism. Further to enhance the targeting prophecy, surface charge on PLGA nanogels needed to be modified (Farokhzad et al., 2010).

The EPR mechanism is another hurdle for the PLGA nanogels delivery. When the nanogels delivered through the passive diffusion may not obtain effective clinical response and required more drug payload to the cancer cells. PLGA alone is unable to access the cell and surpass the blood-brain barrier (BBB), therefore