

# 11

## *Nanotechnology in Biomaterials: Nanoparticulates as Drug Delivery Systems*

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### 11.1 Drug Delivery Systems

A drug delivery system (DDS) can be defined as the system that achieves the administration of a therapeutic agent to the patient and improves the drug's efficacy and safety by controlling the concentration, rate, time, and place of release of drugs in the body.<sup>1</sup> The primary purpose of drug delivery systems is to deliver the drug efficiently and precisely to a targeted site in an appropriate period of time, while maintaining a high concentration of the drug in the diseased site and as low as possible in the healthy tissue.<sup>2</sup>

In conventional systems plasma drug levels increase after administration to a patient, and then decrease to an ineffective level; however, the concentration should be in the therapeutic window. When a new administration is made, the same rise and fall happens. To overcome this low dose problem, higher drug concentrations can be applied, but this increases the risk of toxic effects of the drug and the treatment cost. For many diseases, the therapeutic agent should reach a certain concentration and remain constant at the site of action. In conventional systems, however, the plasma drug levels do not remain constant,