POLYMER–DRUG NANOCONJUGATES

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7.1 INTRODUCTION

Polymeric nanomedicine, an emerging field that involves the use of drug-containing polymeric nanoparticles (NPs) for cancer treatment, is expected to alter the landscape of oncology [1]. The medical application of nanotechnology has been extensive: roughly 40 nanomedicines have already been approved by the Food and Drug Administration (FDA) for clinical use [2–4] and a handful of NPs are currently in preclinical investigations [2,5]. Incorporation of chemotherapeutic agents in NP delivery vehicles can improve water solubility, reduce clearance, reduce drug resistance, and enhance therapeutic effectiveness [6]. Broadly speaking, two approaches have been used to load drugs in NPs for delivery. One is to encapsulate drugs within NPs via noncovalent bonds, that is, distribution of the drug throughout a polymeric matrix during formulation (Figure 7.1a) [7]. The second loading strategy is the formulation of NPs using polymer–drug conjugates, a technique first proposed in 1975 (Figure 7.1b) [8]. In this chapter, we discuss the pros and cons of the two strategies and introduce newly developed polymer-drug conjugates—so-called nanoconjugates—as a formulation strategy which addresses challenges faced by both encapsulates and conjugates

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