MULTIFUNCTIONAL DENDRITIC NANOCARRIERS: THE ARCHITECTURE AND APPLICATIONS IN TARGETED DRUG DELIVERY

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5.1 RECENT ADVANCES IN DENDRITIC NANOMATERIALS

Dendrimers are hyperbranched, monodispersed macromolecules with chemically well-defined structures. Synthesized by either the convergent or divergent method, a dendrimer consists of three functional domains (core, interior, and periphery) as shown in Figure 5.1. Each domain of a dendrimer can be tailored to precisely and easily control its molecular weight, size (hydrodynamic radius), and surface charge and functionality [1]. The highly controllable physical properties of dendrimers enable the fine-tuning of their biological properties, such as cytotoxicity, biodistribution, and intracellular uptake/trafficking/fate [2–4]. Furthermore, the large number of the surface groups also allows facile multifunctionalization of dendrimers through incorporation of a variety of functional molecules such as therapeutic and diagnostic moieties. The high deformability and the capability to precisely control their surface functional groups make dendrimers ideally suited for mediating strong multivalent interactions between ligands and receptors [5–7]. These unique properties of dendrimers have led these nanomaterials to become one of the most promising platforms for targeted drug delivery. Over the past two

Pharmaceutical Sciences Encyclopedia: Drug Discovery, Development, and Manufacturing,
Edited by Shayne C. Gad