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Dendrimer as nanocarrier for drug delivery

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ABSTRACT

Dendrimers are novel three dimensional, hyperbranched globular nanopolymeric architectures. Attractive features like nanoscopic size, narrow polydispersity index, excellent control over molecular structure, availability of multiple functional groups at the periphery and cavities in the interior distinguish them amongst the available polymers. Applications of dendrimers in a large variety of fields have been explored. Drug delivery scientists are especially enthusiastic about possible utility of dendrimers as drug delivery tool. Terminal functionalities provide a platform for conjugation of the drug and targeting moieties. In addition, these peripheral functional groups can be employed to tailor-make the properties of dendrimers, enhancing their versatility. The present review highlights the contribution of dendrimers in the field of nanotechnology with intent to aid the researchers in exploring dendrimers in the field of drug delivery.

Contents

Abbreviations: AFM, atomic force microscopy; BHA, benzhydrylamine; BSA, bovine serum albumin; CE, capillary electrophoresis; CNTs, carbon nanotubes; CPDs, cationic phosphorus-containing dendrimers; CZE, capillary zone electrophoresis; DMPC, 1,2-dimyristoyl-*sn*-glycero-3-phosphocholine; DOX, doxorubicin; DPA, 2,4-dichlorophenoxyacetic acid; DSC, differential scanning calorimetry; DTPA, diethylene triamine pentaacetic acid; EDTA, ethylenediamine tetraacetic acid; ESI, electrospray ionization; ESI-MS, electrospray ionization-mass spectrometry; FA, folic acid; FAB-MS, fast-atom bombardment-mass spectrometry; FITC, fluorescein isothiocynate; FRET, fluorescence resonance energy transfer; FT-ICR MS, fourier transform ion cyclotron resonance mass spectrometry; FT-IR, fourier transform infrared spectroscopy; GFP, green fluorescence protein; GOx, glucose oxidase; Hb, hemoglobin; HCT, haematocrit; HEPES, (4-(2-hydroxyethyl)-1-piperazineethanesulfonic acid); HPLC, high performance liquid chromatography; HRP, horseradish peroxide; HSV, herpes simplex virus; LC, liquid crystalline; LDH, lactate dehydrogenase; MALDI-TOF MS, matrix assisted laser desorption ionization-time of flight mass spectrometry; MAP, multiple antigen peptides; MPEG, methoxy polyethylene glycol; MRI, magnetic resonance imaging; MS, mass spectrometry; MTD, maximum tolerated dose; MTX, methotrexate; NMR, nuclear magnetic resonances; NSAIDs, non steroidal anti-inflammatory drugs; OS, organosilicon; PAGE, polyacrylamide gel electrophoresis; PAMAM, polyamidoamine; PAMAMOS, PAMAM-organosilicon dendrimers; PAMAM-SAHs, PAMAM succinamic acid dendrimers; PEI, polyethylenimine; PPI, poly (propylene imine); PSMA, prostate-specific membrane antigen; PTX, paclitaxel; PVP, polyvinyl-pyrrolidone; RES, reticuloendothelial system; RNase, ribonuclease; RST, repetitive synthesis technique; SANS, small-angle neutron scattering; SAXS, small-angle X-ray scattering; SEC, size exclusion chromatography; siRNA, small interfering RNA; TEER, transepithelial electrical resistance; TEM, transmission electron microscopy; TGA, thermogravimetric analysis; TLR4, Toll-like receptor 4; UPLC, ultra performance liquid chromatography; WBCs, white blood corpuscles; XRD, X-ray diffraction.

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