

Biological Profiles of Cationic Dendrimers

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Cationic dendrimers are a family of highly branched polymers characterized by their unique structure and properties. Cationic dendrimers have attractive nano-characteristics for the delivery of nucleic acid and various biomedical applications. A variety of cationic dendrimers, such as starburst polyamidoamine (PAMAM), polypropylenimine (DAB) and phosphorus-containing dendrimers, have been studied as potent gene delivery systems. Before using cationic dendrimers *in vivo*, their biological profiles must be fully understood. Here we examined : (1) the apoptotic and necrotic effects of starburst PAMAM and DAB dendrimers in cultured RAW 264.7 murine macrophage-like cells; (2) the intracellular responses- reactive oxygen species (ROS) content, mitochondria membrane potential, cell size and complexity, and cell cycle profiles- in U-937 human macrophages treated with poly(propyleneimine) dendrimers generation 2 (DAB 2.0) and 3 (DAB 3.0); (3) the non-specific interaction of remnant cationic dendrimers with total RNA after isolation directly from cells *in vitro*; and (4) the changes in global gene-expression profiles in human cervical cancer HeLa cells exposed to nonactivated and activated PAMAM dendrimers, alone or in complexes with plasmid DNA (dendriplexes). Our findings provide a novel insight into the biological profiles at the molecular level that dendrimers cause in various cells.