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Effects of non-covalent interactions of methotrexate to a series of 1st tier dendrimer on its binding and breast cancerous cells for toxicological estimation

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A study of 1st tier Dendrimer series (Trimesoyl 1,3,5-tridialkyl malonate ester: TTDAM) as drug delivery vehicle encapsulated with the model drug (Methotrexate: MTX) individually, for breast cancer drug delivery and *in vitro* evaluation of toxicity of serial dendrimers with their complexes on the breast cancer cell line suggesting new awareness for developing safe breast cancer drug delivery system. MTX-TTDAMs were prepared using a 1: 1 ratio of MTX and TTDAM, in acetone medium at RT followed by 24 h. MTX-TTDAMs formed by hydrogen bonding confirmed through FTIR and further characterized by SEM and DLS for their morphological and narrow particle size distribution (on nm scale) respectively. The –OH stretching frequency at 3356.2, 3352.5, 3420 and 3416.3 cm⁻¹ for MTX, MTX-TTDMM, MTX-TTDEM, and MTX-TTDPM, respectively absent in dendrimer series elucidating weak hydrogen bonding between –OH and an ester group. A strong stretching of an amide at 1648.2 cm⁻¹ in MTX, remains at the same position in MTX-TTDMM and MTX-TTDEM aspect MTX-TTDPM shows amide stretching at 1640.7 cm⁻¹, confirms the impact of amide group in binding. MTX-TTDPM illustrated less number of aggregates due to more binding of MTX with TTDPM and rest self-aggregate such as molecular self-assembly. Trimesoyl 1, 3, 5-tridimethyl malonate ester (TTDMM), trimesoyl 1, 3, 5-tridiethyl malonate ester (TTDEM) and trimesoyl 1, 3, 5-tridipropyl malonate ester (TTDPM) has void spaces and functionality which assistances to bind MTX anticancer drugs for their impending use in the breast cancer drug delivery system. The higher hydrophobicity of TTDPM errands more methotrexate binding and controlled release profiles compared to TTDMM and TTDEM. Effects of dendrimers and their complexes were tested on cell viability by SRB assay using a human breast cancer cell line (MCF-7), remarkably inhibits the growth of MCF-7 breast cancer cells..

Biography

Reena Tondwal has completed her MSc from Banasthali University and MPhil from the Central University of Gujarat. Now she is a research scholar and pursuing her PhD from Central University of Gujarat, India. She has published 2 papers and 3rd paper communicated in reputed journals. She has her expertise in Polymer and Dendrimer Chemistry and Drug Delivery.

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