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Targeting of liposomes loaded with Mitoxantrone, into melanoma cells in a 3D spheroid model

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This work describes a novel targeted liposomal formulation of Mitoxantrone, loaded by vitamin C gradient for remote drug loading, which also co-encapsulates anacardic acid in the liposome bilayer. The vitamin C gradient used for mitoxantrone encapsulation in this research was developed in our laboratory, and previously it showed promising results in terms of pharmacokinetics and tumor growth inhibition of liposomal epirubicin. While the formulation was significantly effective on human melanoma, its efficacy could be further improved by active targeting. Surface modifications with ligands specific to receptors which are over-expressed in cancers, or antibodies specific for tumor surface antigens, can enhance the accumulation of liposomes and their encapsulated drug in a tumor. Among these possible targets, cancer cells are known to overexpress Transferrin (Tf) receptors many-fold compared to healthy cells due to increased iron requirement. Hence, targeting the tumors with Tf-conjugated drug delivery systems represents a logical approach to drug delivery. The purpose of this study was to develop Tf-targeted delivery systems co-encapsulating anticancer drugs and anacardic acid, and to evaluate their efficacy in melanoma cells, grown *in vitro* in a 3D spheroid model. Tf-targeted liposomes were prepared by post-insertion of Tf-PEG conjugate into liposomes produced according to our previous method. Melanoma cells generated spheroids with a distinct necrotic core along with proliferating cells in the spheroid periphery, partly mimicking *in vivo* tumors. Our results showed that the Tf-targeted liposomes were able to penetrate deeper layers of spheroids compared to non-targeted liposomal formulations, indicating a higher possibility of delivering drugs more efficiently into the tumor masses.

Biography

Nina Filipczak is a PhD student at Lipid and Liposomes Department (University of Wrocław). Her current research focuses on the use of liposomal nanomedicine for the effective treatment of melanoma cancer. She is also interested in other drug delivery systems, immuno-oncology and cancer biology

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