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TUMOUR-TARGETED NANOTHERAPEUTICS

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Directing anticancer agents specifically to tumours and/or cancer cells by targeting specific extracellular receptors fulfils the following three most important tasks: (1) preventing or at least substantially limiting adverse side effects on healthy tissues (2) enhancing drug internalization by cancer cells and (3) overcoming (at least in part) resistance mechanisms that are based on the active efflux of exogenous drugs from cancer cells. We developed several tumour-targeted nanoscale-based formulations: various nanocarriers (liposomes, lipid nanoparticles, dendrimers, polymers, quantum dots, mesoporous silica and supermagnetic iron oxide nanoparticles); different anticancer drugs (doxorubicin, paclitaxel, camptothecin, and cisplatin); suppressors of cellular drug resistance and tumour growth (antisense oligonucleotides or siRNA targeted to BCL2, MDR1, MRP1, HIF1A, CD44 mRNA); and tumour-targeting agent - luteinizing hormone-releasing hormone (LHRH). The proposed nanotherapeutics were tested *in vitro* and *in vivo* using established lung and ovarian cancer cell lines and highly metastatic cancer cells isolated from malignant intraperitoneal ascites from patients with advanced ovarian carcinoma. These cells were used to initiate orthotopic models of lung and ovarian cancers in nude mice that were often accompanied by the development of metastases. Tumour-targeted nanoscale-based drug formulations were delivered intravenously and intraperitoneally (for ovarian cancer) or intravenously and by inhalation (for lung cancer). Treatment with the developed therapeutics led to the suppression of targeted proteins, efficient induction of cell death, effective tumour shrinkage, prevention the development of metastases and limitation of adverse side effects.



Biography

Tamara Minko, PhD is a Distinguished Professor and Chair of the Department of Pharmaceutics at Rutgers, The State University of New Jersey and member of the Cancer Institute of New Jersey. Her current research interests include drug and nucleic acids delivery, nanotechnology, personalized nanomedicine, biopharmaceutics, imaging and molecular targeting. She is an Author and Co-author of more than 400 publications. Her Hirsch factor is above 50. She is a President of Controlled Release Society (CRS), an elected Fellow of three organizations: CRS, American Association of Pharmaceutical Scientists (AAPS), and American Institute for Medical and Biomedical Engineering (AIMBE); recipient of numerous awards, Executive Editor of Advanced Drug Delivery Reviews, Editor of Pharmaceutical Research, member of editorial board of more than ten scientific journals. Her research is supported by grants from NIH, NSF, DOD and other national and international sources.

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