Università di Roma "Tor Vergata"

Dipartimento di Scienze e Tecnologie Chimiche
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AVVISO DI SEMINARIO

Natalya Rapoport
Lunedi 26 settembre alle ore 11:00

Nell' Aula seminari del Dipartimento di Scienze e Tecnologie Chimiche

Terrà un seminario dal titolo:

PERFLUOROCARBON NANOCARRIERS FOR ULTRASOUND-MEDIATED DRUG TARGETING TO TUMORS: REVISION OF PARADIGMS THROUGH INTRAVITAL IMAGING.

Proponente; Prof. Paradossi

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PERFLUOROCARBON NANOCARRIERS FOR ULTRASOUND-MEDIATED DRUG TARGETING TO TUMORS: REVISION OF PARADIGMS THROUGH INTRAVITAL IMAGING

Natalya Rapoport
Department of Bioengineering, University of Utah, Salt Lake City, Utah, USA

During the last decade, progress in nanomedicine has enabled tumor-targeted delivery of anticancer drugs *via* their encapsulation in tiny carriers called nanoparticles. Nanoparticle tumor targeting is based on the "Achilles' heels" of cancerous tumors – their poorly organized and leaky microvasculature. Due to their size, nanoparticles are not capable to penetrate through a tight healthy tissue vasculature. In contrast, nanoparticles penetrate through a leaky tumor microvasculature thus providing for localized accumulation in tumor tissue. A local release of an encapsulated drug may be triggered by tumor-directed ultrasound; application of ultrasound has additional benefits: ultrasound enhances nanoparticle penetration through blood vessel walls (extravasation) as well as drug uptake (internalization) by tumor cells.

Recently, ultrasound contrast agents (microbubbles) have attracted attention as drug carriers and enhancers of drug and gene delivery. Unfortunately, their micron-scale size does not allow effective extravasation from the tumor microvasculature into tumor tissue. In Dr. Rapoport's lab, this problem has been solved by the development of nanoscale microbubble precursors, namely drug-loaded nanodroplets that converted into microbubbles under the action of ultrasound. Nanodroplets comprised a liquid core formed by a perfluorocarbon compound and a two-layered drug-containing polymeric shell. Nanodroplets were manufactured from drug-loaded polymeric micelles. Using these formulations, we studied effectiveness of drug-loaded micelles and nanoemulsions in treating breast, ovarian, or pancreatic cancerous tumors in mouse models; this treatment modality has been proved very effective. In the case of nanodroplets, tumor-directed ultrasound significantly enhanced treatment efficacy. Dramatic tumor regression and sometimes complete resolution was observed when optimal nanodroplet composition and ultrasound parameters were applied.

Natalya Rapoport Ph.D. , D.Sc., Professor

Research: Developing targetable drug delivery systems to treat drug sensitive and drug resistant solid tumor carcinomas. A novel drug deliver modality is based on the drug encapsulation in nanoparticles followed by tumor-localized drug release triggered by ultrasound. This modality is currently being tested in vivo using ovarian, breast, and colon cancer models in nu/nu mice.

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