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TITLE

Targeted drug delivery systems: Achievements and challenges

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Targeting of therapeutic agents to molecular markers expressed on the surface of cells requiring clinical intervention holds promise to improve specificity of delivery, enhancing therapeutic effects while decreasing potential damage to healthy tissues. Targeting to cellular receptors involved in endocytic transport facilitates intracellular delivery, a requirement for a number of therapeutic goals. However, after several decades of experimental design, there is still considerable controversy on the practical outcome of drug targeting strategies. The plethora of factors contributing to the relative efficacy of targeting makes the success of these approaches hardly predictable. Lack of fully specific targets, along with selection of targets with spatial and temporal expression well aligned to interventional requirements, are difficulties in this process. Selection of adequate sub-molecular target epitopes determines accessibility for anchoring of drug-conjugated targeting moieties and bulky drug carriers, as well as proper signaling for uptake within the cell. Targeting design must adapt to physiological variables of blood flow, disease status, and tissue architecture by accommodating physicochemical parameters, such as composition, functionalization, geometry, and avidity. In many cases, opposite features need to meet a balance, e.g., sustained circulation versus efficient targeting, penetration through tissues versus uptake within cells, internalization within endocytic compartment to avoid efflux pumps versus accessibility to molecular targets within the cytosol, etc. Detailed characterization of these complex physiological and design parameters, along with a deep understanding of the mechanisms governing the interaction of targeted drugs and carriers with the biological environment, are necessary steps toward achieving efficient drug targeted systems.

Biography

Silvia Muro trained as a Molecular Biologist in Spain, focusing on genetic diseases, and then moved to University of Pennsylvania Medical School to work on drug delivery systems. She is currently an Assistant Professor in the Fischell Department of Bioengineering and the Institute for Bioscience and Biotechnology Research at the University of Maryland. Her laboratory focuses on targeting of nanomedicines into and across cells, with emphasis on enzyme replacement therapies for treatment of genetic lysosomal storage disorders. She has published over 40 articles and book chapters in these fields and has received awards in the US and Europe for these contributions.