

Vesicular nanocarriers: an all-around approach to nanomedicine

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Efficient and safe drug delivery has always been a challenge in medicine. The development of nanocarriers for drug delivery has received great attention because nanocarriers can theoretically act as "magic bullets" and selectively target pathological sites. The use of both conventional and new drug delivery systems allows to face the major issues in drug release: (a) unfavorable pharmacokinetics and biodistribution which lead to unwanted side effects (e.g. chemotherapy), (b) early drug degradation in the bloodstream by reticulo-endothelial system, and (c) inefficient uptake at target sites that leads to low drug efficacy. In this sense, nanocarriers offer an innovative approach to drug delivery, providing several advantages including cargo protection and increased dose delivery to target sites. The success of a therapeutic strategy depends on nanocarrier ability to entrap drugs, to penetrate through anatomical barriers, to efficiently release the incorporated drugs, to show a good stability and good biocompatibility. Many attempts have been proposed to functionalize and design nanocarriers to increase their efficacy. Furthermore, nanocarriers are becoming highly integrated and multifunctional to include a range of applications such as on-demand release, specific tissue/cell type targeting, in vivo imaging and diagnosis, and photothermal treatment.

The research activity developed in our laboratory is mainly focused on preparation and characterization of vesicular nanocarriers for therapeutic and diagnostic applications.

In particular, pH sensitive, magnetic niosomes have been prepared and deeply characterized, Furthermore, vesicles for nasal administration and for pulmonary administration have been developed.