Combination of exosomes with advanced therapies for cancer theragnosis

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Exosomes are vesicles of endocytic origin from 20 to 200 nm in diameter secreted by the majority of the cells present in the organism.[1] They are surrounded by a lipidic membrane similar to the plasmatic membrane and they contain cytosolic components from the parental cell, including mRNA, miRNA, DNA and proteins, which can be transferred to recipient cells.[2] These vesicles were thought to serve as a mechanism to discharge unwanted material from cells, but today they are considered as natural signaling vectors that play an essential role in intercellular communication processes and in the transfer of small molecules among cells.[3] It is known that exosomes secrete specific molecules to receptor cells and that they can reach different target tissues according to the characteristics of the cells from which they were originated.[4] Thus, it is not surprising that exosomes are emerging as ideal delivery vehicles for theragnostic applications including drug carriers, gene vectors, imaging tools and therapeutic agents.

Even though most of the exosome-based tools consist in the combination of them with RNAs, proteins or chemoterapeutics, other types of advanced therapies can be combined into those vesicles.[5] Nanotechnology is considered the study, control and application of matter at nanoscale level and it has a large variety of applications, being nanomedicine one of the most important.[6] This discipline applies the unique properties of the nanomaterials such as their reduced size and their high relation surface/volume ratio to develop novel tools for control, treatment and diagnosis of biological systems.[7],[8] In particular, thanks to their long circulation time, small size, low immunogenicity and targeting capability, exosomes exhibit ideal characteristics as vectors to deliver therapeutic nanotechnological cargo to specific cells. Therefore, considering the exosomal characteristics previously mentioned, they provide a stable environment to transport theragnostic nanomaterials avoiding the immune response and allowing them to fuse with the plasma membrane to enter directly in the target cells. Herein, we evidence how exosomes provide nanotechnology with robust and feasible biological nanovehicles as cancer theragnostic vectors.[4],[9],[10]

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