The Torch
Vol. 2 (52)

Extracellular vesicles as a drug delivery system

Manasvini Sridharr

Extracellular vesicles (EVs) are lipid bilayer-bound vesicles that are secreted by the cells into the extracellular space. The bilayer allows the EVs to encapsulate proteins, nucleic acids, lipids and other metabolites as well. This is what gives them the ability to be engineered to carry specific drugs to target cells. Extracellular vesicles are mainly of three types namely microvesicles, exosomes and apoptotic bodies. Microvesicles are a type of EVs that are released by the cell membrane. In multicellular organisms, they can mainly be found in bodily fluids and the interstitial spaces of tissues. Exosomes are EVs that contain components of the cells that release them. They can affect the functions of other distant cells. Apoptotic bodies are vesicles that are formed when a cell undergoes apoptosis, which contain some of the components of the dying cell. An ideal drug delivery system would entail favourable pharmacokinetics and most importantly, tissue sensitivity. The ability to recognise and target only the required cell and not the healthy cells around it plays a key role in therapeutics.

Artificial, as well as natural extracellular vesicles, would work as perfect drug delivery systems because of their small size and the presence of adhesive molecules on their surfaces along with the innate ability to be a biomolecular communication and delivery system. The EVs can be loaded with the required drugs and made to deliver to the target cell without affecting any healthy cells around it. Extracellular vesicles work well as drug delivery systems against diseases like cancer. They have already been found to participate in the tumour microenvironment and in some cases even promote metastasis. They also help establish cell-to-cell communication between the cancer cells. If manipulated, the EVs can begin to work against cancer and can even stop the spread. The cancer cells will recognise the drug-loaded EVs as their own, and will grant them access into the microenvironment. The EVs can then successfully deliver the drug, which will then combat the disease. Preliminary research is being conducted in this field to determine if these drug delivery systems can novelise chemotherapy and reduce the risks posed to the patient. A challenge with this concept is that natural EVs are quite difficult to isolate and may lose their properties post isolation. Several experiments and research are being conducted to synthesise artificial EVs for the sole purpose of drug delivery.

Keywords: Extracellular vesicles, Drug delivery systems, Microvesicles, Exosomes, Apoptotic bodies, Cancer, Chemotherapy

Citation:
Manasvini Sridharr. Extracellular vesicles as a drug delivery system. The Torch. 2021. 2(52). Available from: https://www.styvalley.com/pub/magazines/torch/read/extracellular-vesicles-as-a-drug-delivery-system.