

ENGINEERING EXTRACELLULAR VESICLES FOR TUMOUR TARGETED THERAPY

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Extracellular vesicles (EVs) shuttle genetic material including microRNA (miRNA) between cell populations and throughout the circulation, and hold immense potential as biomarkers of disease and vehicles for therapeutic drug delivery. Mesenchymal stem cells (MSCs) have the proven capacity to home to sites of metastatic tumours and to evade immune surveillance. MSC-tumour tropism and apparent immunosuppressive characteristics of the cells, has raised tremendous interest in their potential as tumour-targeted delivery vehicles for therapeutic agents. It has become clear that MSC-based therapy response does not correlate with the level of cell engraftment, but is paracrine in nature. MSCs are potent secretory cells, and release EVs in large quantities. These EVs are thought to target specific sites when systemically administered in a manner reflective of the parent cell. We recently engineered MSCs to secrete EVs loaded with a tumour-suppressor microRNA, miRNA-379. Systemic administration of miRNA-379-EVs was well tolerated and reduced breast cancer growth *in vivo*. This evidence strongly supports the hypothesis that systemic delivery of MSC-derived EV-encapsulated miRNAs may offer therapeutic promise in the treatment of metastatic breast cancer. Along with treatment of existing metastases, MSC-EVs have the potential to inhibit remodelling of pre-metastatic niches systemically, and reduce cancer progression and recurrence. EVs are also released into the circulation by cancer cells and may represent a fingerprint of the tumour, raising potential for the circulating EV-miRNA profile as a biomarker of response to therapy.

BIOGRAPHY

Róisín M Dwyer is a Lecturer in Translational Science in the discipline of surgery at National University of Ireland Galway. Following graduation from University College Dublin (UCD) with a degree in Science, she has completed her MSc in Biological Sciences at Dublin City University (DCU), and then was awarded her PhD in Medicine and Therapeutics from UCD. This led her to a postdoctoral research position at the Mayo Clinic, Rochester, Minnesota. She has established a research programme, in collaboration with both national and international research groups, focusing on novel approaches to breast cancer detection and therapy in Ireland.

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