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Exosomes: Growing interest as vectors of molecular entities

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Exosomes are a type of extracellular vesicle (EV) having a unique generation pathway and characteristics. EVs characteristics and cargo vary by the type and state of the cells involved in their generation. They naturally carry such diverse cargo as RNA, DNA, lipids, peptides and vast array of proteins

Exosomes are produced by many types of cells and have been discovered in nearly every bodily fluid. Their presence has been reported in the growth medium of many cultured cells, including B lymphocytes, dendritic cells, cytotoxic T-cells, intestinal epithelial cells, neurons, oligodendrocytes, platelets, mast cells, and Schwann cells. They have been demonstrated to be active in immune response; neural communication; reproduction and development; as well as in cell proliferation, homeostasis and maturation. Interest in exosomes is growing due to the discovery of their potential in so many research, diagnostic, analytic and therapeutic procedures.

Reasons for interest in exosomes include their observed paracrine-like activity (replacing the communication exhibited by their cells of origin) and their use as a vector of proteins, nucleic acids or small-molecule drugs in therapeutic applications. There are many approaches being pursued to use exosomes as a vector of therapeutic agents. The primary way is to employ a means of disruption of the membrane (such as shear-forces) to allow passive diffusion of drug substance into the exosome. Others describe their modification through the fusion of exosomes with liposomes harboring desired proteins, lipids or synthetic polymers. Some have even proposed such creative manufacturing approaches as the in vitro mass-production of exosome-mimicking nanovesicles using a mini-extruder.

Codiak is a biotech start-up that has raised nearly $170 million toward development of exosomes in therapeutic applications. They and others are manipulating exosomes to solve drug delivery issues for small molecules, RNA therapies, proteins, viral gene therapy, and even CRISPR gene-editing tools.

Speaker Biography

William Whitford is Strategic Solutions Leader, BioProcess, GE Healthcare, USA with over 20 years' experience in biotechnology product and process development. He joined the company 16 years ago as a team leader in R&D developing products supporting biomass expansion, protein expression and virus secretion in mammalian and invertebrate cell lines. Products he has commercialized include defined and animal product-free hybridoma media, fed-batch supplements, and aqueous lipid dispersions. An invited lecturer at international conferences, he has published over 250 articles, book chapters and patents in several areas of bioproduction. He now enjoys such industry activities as serving on the editorial advisory board for BioProcess International.

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